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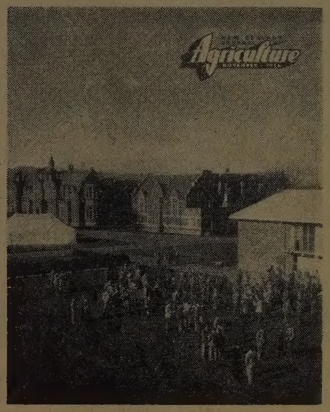
This Month's Cover



Canterbury Agricultural College, Lincoln, scene this month of the New Zealand Grassland Association's 18th conference, is the subject of this month's cover from a colour photograph by R. V. Francis Smith at the College's 1956 Farmers' Conference. The College, about 12 miles south-west of Christchurch, was founded in 1880 and is the oldest agricultural college in the Southern Hemisphere. The College farm is of 1348 acres and an outlying farm, Ashley Dene, of 878 acres of light land, is worked in conjunction with the home farm. Agronomic research has always been a major activity at the College and has led to many improvements and developments in crops and pastures and the application of fertilisers.

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REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

The orchard stands out like an oasis amid the surrounding barren hills.

Central Otago Pip and Stone Fruit Orchard

CENTRAL OTAGO is justly famous for its stone and pip fruits. Some growers specialise in either stone or pip fruits, but most of the orchards are a mixture of both. This enables growers to spread their harvesting, and thus their income, over a much longer period and to handle their crops with a minimum of labour. In this article W. S. Kemp, Horticultural Instructor, Department of Agriculture, Alexandra, gives the history of one of these mixed orchards in one of the more favourable parts of the Earnscleugh district and describes the cultural practices adopted and the results obtained.

THOUGH commercial fruit growing in the Alexandra district dates back to the 1860s, no great expansion took place until the completion of the Central Otago railway to Alexandra in 1906. From then the main development of Earnscleugh as a fruit growing area began.

At this time the property to be discussed was owned by an old miner and comprised mostly pasture with a small domestic orchard containing plums, pears, and cherries. The property was then bought by Mr. J. King for developing into an orchard. After consulting Mr. J. Bennetts and other pioneers of the fruit industry on the best commercial varieties he selected a mixture of stone and pip fruit varieties, and the planting of about 8 acres began in 1910.

While the orchard was young Mr. King, like many other pioneers of the industry, worked on the gold dredges then operating extensively in the district. By the time the trees began cropping extensive plantings had been made in the district. In Vincent County the area in orchards had risen from just over 650 acres in 1910 to some 2250 acres in 1916. Low returns for fruit marketed and the difficulty of transport over the 6 miles separating the property from the railhead at Alexandra caused Mr. King to dispose of the property in 1917 and acquire one closer to Alexandra, where he is still associated with the industry.

The new owner was the late Mr. R. S. Kinnaird (father of the present occupier), who was to become well known in the fruit growing community through his work on behalf of the industry. Before he bought the property Mr. Kinnaird, who had come to the district in 1912, had been associated with Mr. G. M. Marshall, a pioneer in the development of fruit growing in the Earnscleugh district, being responsible for the management of the extensive Matangi orchards.

The orchard is at the head of Blackman's Gully on the left bank of the Omeo Creek. It nestles at the edge of the foothills of the Obelisk or Old Man Range and is protected by them to some extent. Shelter belts have been added at various stages until today the orchard is ringed on three sides with a mixture of poplar, willow, pine, and Lawson's cypress. It is well sheltered from a southerly quarter, but rather exposed on the west.

The soil, which is one of the most fertile in the district, belongs to the Idaburn series. It is derived from schist alluvium mixed with a small portion of tertiary clay and consists of mixtures of deep fine sand and fine silt loams. There is a tendency for a compacted layer to form at a depth of about 18in.

Plantings

One tree remains from the original house orchard of the old gold miner. This is a Vicar of Winkfield pear which, though well over 50 years old,

▲ Young peaches in a block in which trees have been replaced, with a pear block in the background.

is still vigorous and producing heavy crops.

No complete record of the original trees planted by Mr. King is available today, but many of them are still producing good crops and the main change has taken place among the nectarines and peaches. Though some of the peach trees of the original plantings, now about 45 years old, are still cropping well, they will soon have to be replaced. A replacement policy has been carried out over the past decade, so that today many of the peach trees are either non-bearing or just coming into full bearing. Though some difficulty is being found in establishing new trees, particularly close to old-established trees, on the whole replacement of peach by peach is producing reasonably good trees.

Original apple varieties comprised mainly Scarlet Pearmain, Scarlet Nonpareil, Shorland Queen, and Dougherty and these have since been either reworked to varieties more popular today, such as Cox's Orange Pippin and Delicious, or replaced by stone fruits.

Originally trees were planted 18ft. apart on the square, with varieties in

Vicar of Winkfield pear, which is → the sole remaining tree from the original house orchard. It is 40ft. high and well over 50 years old.

rows rather than in blocks. Some of the subsequent extension, which has brought the present area in orchard to about 12 acres, followed this system, while other trees were planted at the same spacing but in staggered rows. A block of Williams Bon Chretien pears was planted 18ft. x 9ft. with the intention eventually of cutting out trees to leave those that remained at 18ft. x 18ft. spacings. As often happens in such cases this has not yet been done and will need to be undertaken shortly if the trees are not to suffer unduly.

The pears were planted in ground previously occupied by cherries which had been removed owing to the failure of one variety making it uneconomic to net the block. There was a further small block of cherries near the residence. To facilitate extension of this apples were removed and cherries planted at very close spacing. Subsequently the spacing proved too close and some of the trees were later removed to give a wider spacing. The original part of this area was netted in 1924 and the cage extended to cover the remainder of the planting in 1937.

Plums planted near the cherry cage have not proved satisfactory and the present intention is to replace these with cherries. The cage will then be extended over these trees, which will serve to replace any losses in the present cage and so maintain production.

Some indication of the changing trends in kinds of fruits grown can be gained from the following list of tree figures:—

	1927	1937	1947	1955
Apple	284	246	221	231
Pear	132	126	214	212
Quince ..	60	59	—	—
Peach ..	407	546	645	575
Nectarine ..	143	140	25	25
Apricot ..	245	311	295	292
Plum	105	137	140	145
Cherry ..	53	254	123	115

Frost

The risk of frosts in spring and autumn has always been one of the main drawbacks to fruit growing in Central Otago. Very few seasons are free from frost damage, however slight. For that reason areas least subject to frost risk are in demand for orchards and in this respect Mr. Kinnaird's property is fairly favourably situated in comparison with other parts of the Earnscleugh district.

Until 1927, when the present widely used lard-pail fire pot was designed and demonstrated successfully, growers had no means of combating these frosts and in many seasons crops were seriously affected. From 1927 until 1933 frosts were mainly light and few growers provided themselves with this new means of combating the risk. The spring of 1933, however, was the most disastrous ever experienced, the entire crop in many orchards being wiped out by a series of heavy frosts in late October. Mr. Kinnaird was as seriously affected as most of his fellow growers, the only ones in the whole of Earnscleugh with any quantity of fruit being two who had installed a number of the new fire pots.

The following year Mr. Kinnaird bought 1000 fire pots—enough to give protection to most of his stone fruits—and the necessary accessories, such as frost alarm and thermometers. Though it was a heavy financial burden, he could see this was the only way to ensure having a regular livelihood from his orchard. In subsequent years some loss from frost has occurred, but a substantial part of the crop has been saved.

Until recent years oil for frost fighting was received and stored on the orchard in 44-gallon drums. A large area was needed for holding a quantity of drums and handling them was heavy work. In 1953 two 1000-gallon tanks were installed and oil is now brought to the orchard in tankers and pumped into these tanks.

Similar progress has been made in the method of refilling fire pots once they are placed out in the orchard. Originally this was done by hand, the oil being carried in 4-gallon buckets from the drums to the pots. Today by minor alteration the spray pump can be adapted fairly quickly for this purpose, and with two hoses with oil guns attached where the spray guns are normally fitted two rows of pots can be filled simultaneously as the tractor draws the bulk supply slowly through the orchard.

Stocks of oil on hand in spring at the beginning of the frost-fighting season amount to 3350 gallons, with 2000 gallons in the bulk-storage tanks and 1350 gallons in the fire pots in the orchard. The aim is to maintain this reserve at all times. The amount of oil used annually varies with the amount of frost. Every year since the pots were installed at least some have been lit, though the oil consumed may have been only a few hundred gallons.

Portion of the irrigation storage dam, which was constructed by bulldozer and which has a capacity of 750,000 gallons.

Some of the Foster peach trees, now 45 years old, in Mr. Kinnaird's orchard.

In the spring of 1953, which was one of the worst frost years since 1933, over 6000 gallons of oil was burnt.

Though pots have been used for 20 years, most of the original ones are still in service, replacements being necessary mainly owing to damage. The number of pots used has been increased to about 1100.

Cultivation

The original means of cultivation was a one-horse, spring-tooth cultivator and the practice was to maintain clean cultivation and suppress all weed growth. Later Mr. Kinnaird and his brothers, who had a property elsewhere in Earnscleugh, purchased a wheel tractor and discs. In 1947 Mr. Kinnaird bought a 5ft. rotary hoe and this is now the only cultivating implement.

Clean cultivation has long been abandoned, because not only was irrigation more difficult under this system, but the soil structure, already poor through being naturally low in humus, was rapidly being further damaged through the action of hot summer sun.

For some years until recently the practice was to rotary hoe in late autumn and again in spring before the frost pots were set out. Volunteer weed growth was then allowed to develop and was cut periodically with a hay mower.

Permanent grassing down appealed to Mr. Kinnaird, but he was deterred at first from carrying it out because of the possible increase in the amount of frost occurring over grass as compared with clean-cultivated ground. However, encouraged by the experience of one or two growers who tried grassing down and because of the manifest advantages of the system, Mr. Kinnaird finally decided to sow down to permanent pasture, and a rotary mower was obtained for grass cutting.

Fertilisers and Cover Crops

The soil being naturally fertile, fertilisers have not been used extensively, though more attention is now being paid to this aspect of soil management. In the past light dressings of nitrogen, phosphate, and potash were applied during the period of clean cultivation. Over the past few seasons a ready-mixed orchard fertiliser containing two parts of phosphate, one part of nitrogen, and one part of potash has been applied at from 4cwt. to 5cwt. per acre.

Cover cropping was begun when it was realised that the already low level of organic matter in the soil was being rapidly depleted and has been carried on in various forms.

As trees were considered to be also showing symptoms of lack of nitrogen, the cover crops tried were those capable of returning nitrogen to the soil. Blue lupins were found unsuitable because of the cold winters, and red clover and white clover were eventually discarded in favour of oats and peas as being crops that would return the greatest bulk of organic matter.

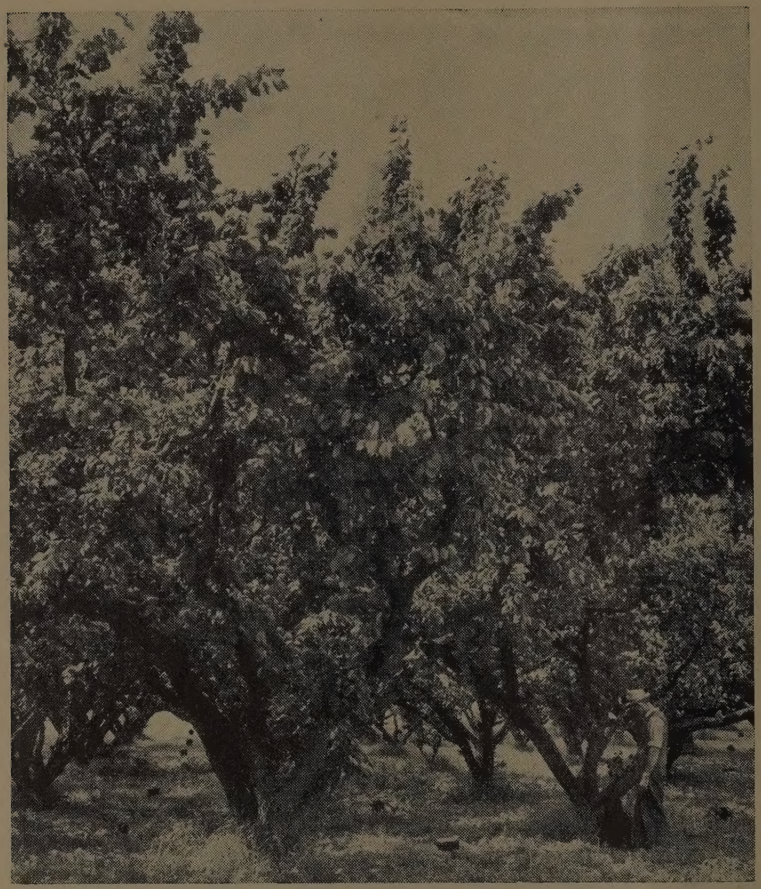
In an old-established orchard adequate growth of cover crops is difficult to obtain owing to the shading effect of the fruit trees. Extensive use has been made therefore of pea straw obtained from up-country farmers and up to 1000 bales of this material has been spread and later incorporated into the soil by rotary hoe annually.

Irrigation

Without irrigation Central Otago is virtually a desert and this is well illustrated by the bare hills surrounding the orchard shown in the heading photograph. Water supplies are drawn from the Blackman's water scheme, which was jointly owned by the settlers in the upper part of Earnscleugh, and the right was vested in the Vincent County Council. This has now been taken over by the Ministry of Works and the scheme enlarged and included in the Fraser River irrigation scheme. Water is taken by settlers in rotation, Mr. Kinnaird's allocation being two heads for 10 hours each week.

In most years, however, particularly in the latter half of the irrigation season, the flow of water in the race is insufficient to enable full allocation to be delivered and allocation has to be cut accordingly. In some years the

CENTRAL OTAGO MIXED ORCHARD



Part of the apricot block, showing 45-year-old trees of the Roxburgh Red variety.

period over which water is received may also be reduced. To make the most efficient use of water a dam with a capacity of 750,000 gallons was constructed by bulldozer in 1950 on a waste corner at the upper end of the property.

After a series of years in which water supplies were so short that fruit crops were affected steps were taken in 1956 to sink a well to see if a supply of underground water could be found. The results will not be known fully until next summer.

Originally furrow irrigation was used, 6 furrows being drawn down each row of trees, and a small flow of water led into these from the head-race constructed across the top of the orchard. When clean cultivation was practised the amount of water let down had to be regulated carefully and constant supervision was necessary to avoid soil erosion.

The change in cultivation practice permitted a change in the method of irrigation, the border system being adopted. Various means of making the borders, which are drawn up and down the tree rows, have been tried, that in use at present being to construct borders with an extended bulldozer blade of a tractor. Annual preparation of borders takes up a good deal of time and it was proposed to lay down permanent borders, and to cultivate in one direction only. Now that the orchard has been grassed permanent borders have been installed.

In the border method a larger volume of water sufficient to cover the area between tree rows is turned out of the head-race into each border in turn, or, if the flow is sufficient several borders may be done at the same time. The water is prevented from flowing laterally by the borders, and as soon as it nears the end of the border the box from the head-race is closed and another opened. This process is adopted until each border in the orchard has been watered.

With a full supply of water the whole area can be irrigated in less than 2 days. Concrete boxes have been installed in all head-races and these cut down time spent in setting water, so that only a few hours of the 2 days are actually spent in attending to irrigation.

In the past irrigation has not been started until after mid-October owing to the difficulty of frost fighting over recently irrigated ground. Mr. Kinnaird considers that earlier irrigation would be beneficial and with permanent grassing down, he is confident irrigation could be done in conjunction with frost fighting.

The irrigation season usually extends until the end of March, but it is intended to carry on later in future. The aim is to irrigate the whole orchard at fortnightly intervals, but this depends on water supply, spraying, and harvesting. The extension to the present scheme is expected to result in a better water supply, but if this does not eventuate Mr. Kinnaird plans to install a pump if the well taps an underground water supply.

Pruning

Pruning is one of the major orchard operations and normally occupies 3 men from early May until mid-August. Sheets are used for collecting all prunings and care is taken to remove all possible diseased wood. From the mats the prunings are collected in heaps and burnt to reduce the incidence of diseases such as brown rot. The ashes are returned to the orchard.

Normally the earlier maturing fruits—cherries and apricots—are pruned first and apples are the last to be finished. As conditions are very cold when pruning is done, the workers spend part of each day digging round the trees to keep warm. Thus by the time pruning is completed this orchard work is also finished.

Thinning

Particularly with most kinds of stone fruits, thinning is essential unless frosts have been particularly severe. Even then it is usually necessary to break up the bunches of fruit to some extent. Mr. Kinnaird is a firm believer in early and heavy thinning to produce fruit of good size and quality.

Normally thinning begins as soon as the fruit is big enough to handle. Apricots are done first (in mid-October) and the other fruits roughly in the order of their maturity. The aim is to finish thinning by Christmas, when the rush of the early stone fruit harvesting begins.

Disease Control

In this dry climate disease control is not as great a problem as in districts with a heavier rainfall. Nevertheless spraying is necessary, particularly for the control of insect pests.

The first equipment used for spraying was a pump driven by a 1½ h.p. engine mounted on a 4-wheeled buggy holding a 50-gallon barrel. About 1930 a stationary spray plant was installed consisting of a 10 g.p.m. pump driven by a 3 h.p. electric motor. Two concrete spray tanks of 200 gallons capacity were installed and the orchard was piped on the 7 by 7 system so that 49 trees were sprayed from each tap installed.

In 1947 the piped system for applying sprays was replaced by a portable sprayer capable of delivering 16 g.p.m. at a pressure of 600lb. per square inch and with a tank capacity of 250 gallons. This was hauled by the tractor and the pump driven from a power take-off. Spraying was carried out by 2 men with 4-nozzle brooms operating from a platform at the rear of the spray tank.

With a mixed orchard the spraying of pip fruits during the busy stone fruit harvesting period has always been a problem, particularly as conditions may not always be suitable for spraying when harvesting of stone fruit is least pressing. The introduction of the semi-concentrate spray machine requiring only one man as tractor driver-operator reduced considerably this difficulty of drawing off labour for spraying and Mr. Kinnaird was among the first in Central Otago to change over to this method of spraying, a conversion unit being attached to the rear of the portable spray outfit in 1954.

Equipment and Buildings

Mr. Kinnaird has always been a firm believer in the need for up-to-date and adequate equipment to do the work necessary on the orchard and he also has a natural aptitude for mechanical matters. Besides the tractor and spray equipment already mentioned there are two trucks, an old one used solely for work in the orchard and a three tonner, which is used for carting fruit and supplies to and from the railway.

Fruit sizing equipment consists of a single-section 8-bin grader with elevator, which has been converted to a rotary bin model. This replaced in 1949 a weight-type grader bought about 1943 and found not entirely suitable for the handling of stone fruit. Previous to this a rope type grader of Australian origin had been used.

Other equipment includes a case-making machine with lidding attachment, 10 orchard ladders of various heights, and the usual range of sundries. There is a well-equipped workshop.

In 1948 a 20ft. x 12ft. x 10ft. cool store capable of holding 1000 bushels was erected to open off the packing shed. This was the second store on a grower's property to be erected in Central Otago. It has proved a tremendous help in handling the stone fruit crop, as in it fruit can be pre-cooled before shipment or held over long weekends and during periods when prices are low. In addition pip fruit can be held for long-term storage if desired.

Semi-concentrate sprayer conversion unit.

As on many other properties the packing shed has grown at various times from small beginnings. The present shed is 33ft. x 30ft. and has a 33ft. x 15ft. loft for additional storage. Besides the cool store there is an adjoining lean-to shed of 20ft. x 20ft. which previously held the stationary spray plant. It is now used to house the tractor and sprayer and the cool store unit.

Accommodation provided for permanent and seasonal workers comprises a 4-roomed cottage and a hut 33ft. x 8ft. containing 2 bedrooms and a living room. Staff varies, but permanent staff normally comprises one married man and a youth. Seasonal staff to cope with harvesting operations usually averages three.

Crops

For many years Mr. Kinnaird's father combined some market gardening with general orchard work to supplement his income, particularly in seasons when the fruit crop was affected by frost. Usually tomatoes were the main vegetable grown. With the introduction of frost fighting and planting of fruit trees on the area previously used for vegetables the growing of vegetables was discontinued, but was revived on a small scale after the gradual removal of old fruit trees for replanting. Vegetable marrows were grown and some high yields have been obtained.

In a mixed orchard such as this harvesting can be spread over a long period. Mr. Kinnaird begins by picking cherries toward the end of November and continues with little break for almost 6 months until the last of the apples are harvested in early May. If desired, the late varieties of pip fruit can be placed in the cool store and packed during winter and spring, though this is not usually done.

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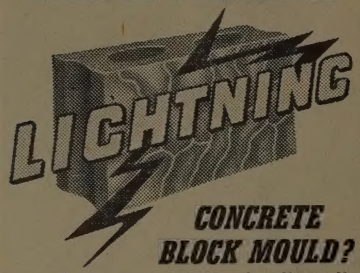

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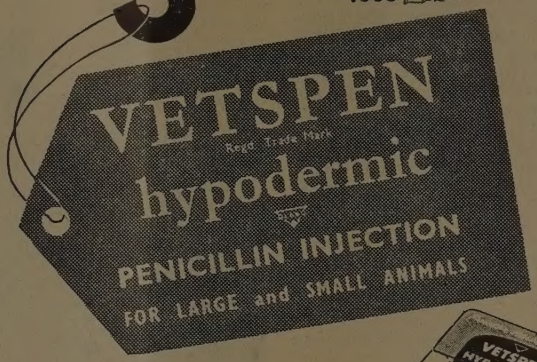

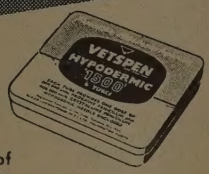

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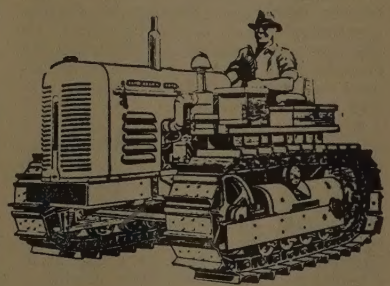

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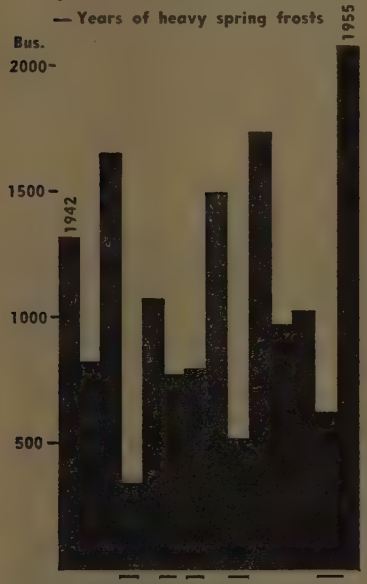
VERY LOW INTEREST TERMS

No records of cropping before 1942 are available today, but the graphs covering production of the various kinds of fruit since then show, particularly with stone fruits, the seasonal fluctuations due to frost.

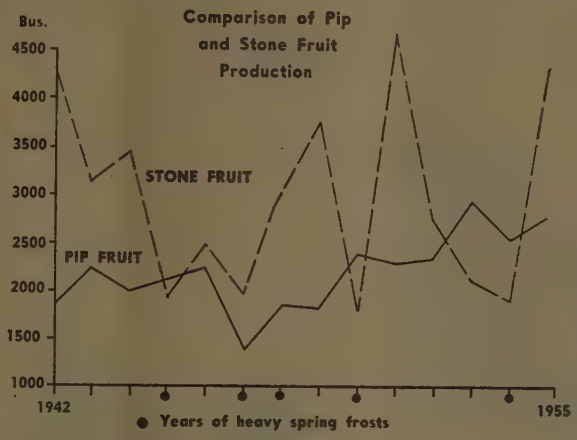
Cherries

Cherries do not appear to be affected by frost to the same extent as other stone fruit. Total number of trees has been declining over the years from 223 in 1937, most of which at that time were non-bearing, to 115 today. Varieties grown in order of maturing are Governor Wood, Werder's Early Black, Doncaster, Dawson, Florence, and St. Margaret. Average production per tree over the past 14 years has been 9 boxes of 10lb. per tree. The variety with the best production is Florence, with an average of 18 boxes per tree.



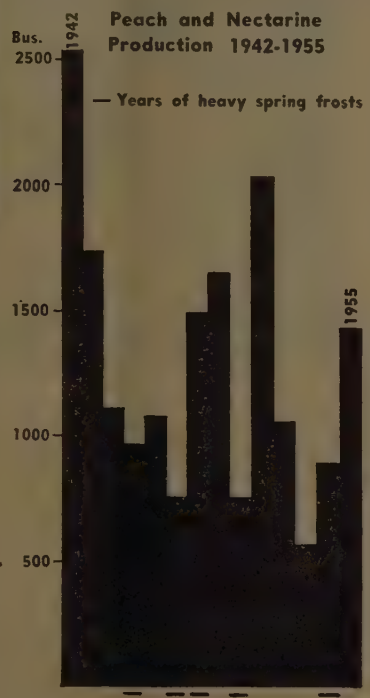
Apricots

Apricots show the greatest fluctuation in cropping, mainly due to their higher frost susceptibility. The number of trees has declined since 1937, when the total was 311, to 292. Some fresh plantings, mainly replacements, over the past decade have been attempted, but these have not met with much success owing to stone fruit blast infection. Varieties grown are Oullins Early Peach, St. Ambroise, Roxburgh Red, and Moorpark, the last being the predominant variety. Average production per bearing tree has been 8 boxes of 20lb., with Oullins showing the best average at 14 boxes.



Peaches and Nectarines

There has been considerable change in the composition of the peach and nectarine block over the past 20 years, as many of the original varieties, such as Triumph, Wiggins, Muir, Kalamazoo, Lady Palmerston, Sea Eagle peaches and Goldmine nectarine, are being replaced by other more popular varieties as they have reached the end of their economic life. Main varieties grown today include Mayflower, Briggs Red May, Hale's Early, Foster, J. H. Hale, Webb's Seedling, Noonan, Peregrine, Mary's Choice, Gold Dust, Golden Queen, and Pullar's Cling peaches and Hunt's Tawny nectarine.



Average production over the period under review is most difficult to determine, as this has been the period of greatest change in the numbers of bearing trees. On the basis of total trees production has averaged 4 boxes of 20lb. per tree, but production over most bearing varieties has been considerably higher. Varieties such as Wiggins and Sea Eagle averaged over 10 per tree for a considerable period when the trees were approaching the end of their economic life.

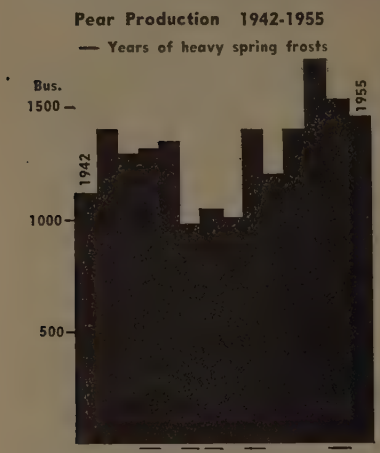
Plums

Plums are of relatively minor importance in the orchard. Principal varieties are Shiro, Satsuma, Greengage, and Yellow Magnum Bonum. The average crop harvested has been less than 5 boxes of 20lb. per tree, though production has been higher, as in years of heavy crops some varieties are often not harvested because of low prices. There has been a fairly large percentage of non-bearing trees, as many of the Shiro variety were planted between 1942 and 1955. Production of certain varieties, particularly Satsuma, has seldom been satisfactory and they appear to be rather prone to frost injury. It is intended to remove them to make way for more profitable kinds of fruit.

Pears

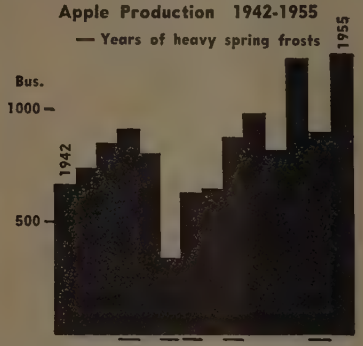
Main varieties of pears grown are Williams Bon Chretien, Winter Bart-

CENTRAL OTAGO ORCHARD



lett, Winter Cole, and Winter Nelis. The bulk of these are original plantings, though the Winter Bartlett were reworked on to P. Barry and the bulk of the Williams Bon Chretien have been planted since 1937. Production has averaged more than 7 bushels per tree over all varieties, even though a large percentage of the Williams Bon Chretien are just coming into production. Winter Cole show the best average of nearly 13 bushels.

The graph for pears illustrates how much more even has been the cropping of them than that of stone fruits. The three consecutive years of low crops from 1947 to 1949 were due partly to frost, but largely to a change



in pruning methods and the drastic elimination of all old spurs.

Apples

There has been a considerable change in the apple varieties and few of the originals remain, having either been removed to make way for stone fruits or reworked to more profitable varieties. Main varieties grown today are Cox's Orange Pippin, Delicious, and Sturmer Pippin. In 1953 some of the poorer producing varieties such as Tasma and Statesman were removed and replaced by Delicious on Malling XVI stock. Several other varieties with only a small number of trees each remain, but it is intended to replace these soon. Over-all production of apples has averaged more than 4 bushels per tree, with Sturmer the best at over 5 bushels.

Conclusion

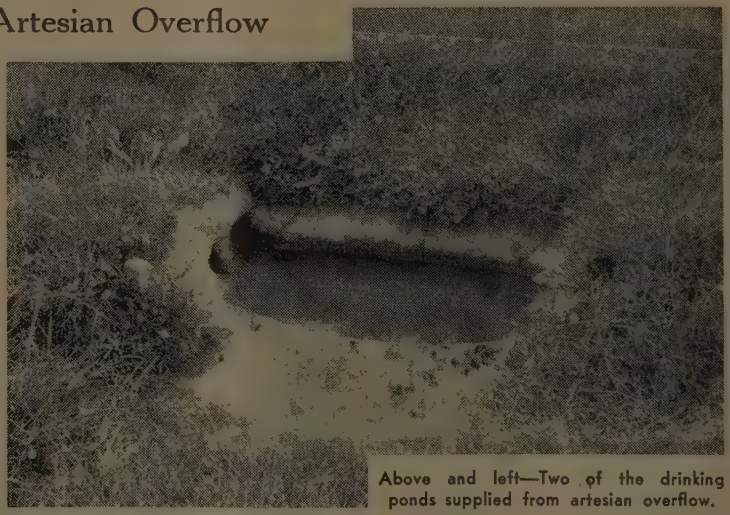
Though the orchard described is more favourably situated than some, there are many equally well sited. Owing to careful selection of varieties in the original planting and a high standard of management by the Kinnaird family, a property has been built up which demonstrates fully the potentialities of fruit growing in Central Otago.

☆

Useful Disposal of Artesian Overflow

ON farms with an artesian water supply it is often difficult to dispose of the overflow from the bore. Generally it is carried away by an open drain which requires periodical cleaning and maintenance. A farmer in the Rongotea (Manawatu) district has been able to dispose of surplus water through his field drainage system and at the same time provide running water for stock.

THE overflow from the artesian bore is led directly into a 6in.-tile line. In two or three positions in each paddock through which the tile line runs a small depression has been graded out to the bottom of the line. Several tiles have been removed and a small ponding area has been deepened and lined with concrete to provide a shallow drinking trough through which water is constantly running. The only maintenance required is a periodical cleaning out of any silt which may have been trampled into the bottom of the trough by stock. Any silt which is carried down the line is trapped at the next trough.



Above and left—Two of the drinking ponds supplied from artesian overflow.

Drainage from adjoining paddocks is also collected by 4in. tiles and moles and fed into the 6in. line.

The scheme thus utilises the normal drainage system not only to remove surplus water as well as the artesian overflow, but also to provide water for stock.

Other paddocks through which the tile line does not run are watered by troughs and a pressure tank system.

—*B. A. J. SMITH,*
Fields Instructor,
Department of Agriculture,
Palmerston North

N.Z. Host to World Grass Scientists

THE Seventh International Grassland Congress to be held at Massey Agricultural College in November will be only the second such congress to have been held outside Europe, the Sixth Congress having been in Pennsylvania in the United States in 1952. Preceding congresses were held in Sweden and Denmark (1930), Switzerland (1934), Great Britain (1937), and the Netherlands (1949).

The Sixth Congress's acceptance of the New Zealand Government's invitation to hold the Seventh Congress in this remote and small country was therefore an implied tribute to the recognition our agricultural scientists and farmers have won through the great advances they have made in comparatively recent years in the science and practice of farming and to the extent to which the products of New Zealand's farmlands enter into world trade.

Short Agricultural History

Countries in which these congresses have been held previously all have much older traditions of organised agriculture than New Zealand has and though the first settlers in this country naturally had, and used, as their chief stock in trade the knowledge of land uses and agricultural practices acquired in their countries of origin, much adaptation and many new techniques have been required in the development of a country so far removed from the oldest continent. Overseas delegates to the congress should therefore find much to interest them in both the research and practical aspects of our agricultural industry.

Appreciative Farmers

The congress itself is a specialist one and attendance has had to be restricted to officially accredited specialist delegates, but some of those attending have already been in the country for some time and many others will be remaining after the congress to visit places of research, farming, and scenic interest and to attend the New Zealand Grassland Association's annual conference at Canterbury Agricultural College, Lincoln, as participants or as visitors. In the few months before and after the congress there will therefore be many opportunities for farmers and others in related occupations in the industry to meet and talk with the visitors. I am sure these opportunities will be fully taken by a farming community whose capacity to understand, appreciate, and apply the methods and results used and produced by research workers in agriculture is one of the foundations of our success in agricultural practice. The extent to which research institutions in this country are working with farmers through conferences, field days, demonstrations, and other extension activities in the discussion and solution of common problems is a guarantee of continued and steady progress in the industry and a feature that will no doubt impress those who are in this country for the congress.

Responsibilities as Producers

New Zealand's success in developing grass as a crop and the consequent volume of this country's pastoral products entering world trade entail a national and international responsibility in a world in which ever-increasing population pressures are creating food and clothing problems of great magnitude. The problems are of both production and distribution, and our remoteness from the areas where even subsistence is so precarious should not lead to the complacency of doing our share toward meeting the production demand while ignoring the other complexities of the problem. Agricultural science is a component part of that whole body of scientific knowledge in its many branches that is making possible astonishing human progress. Only the greatest freedom of exchange of knowledge of science and practice in industries that feed and clothe the peoples of the world can lead to successful solution of the problems of adequate production and distribution.

Beneficial Exchange of Views

Our very remoteness geographically limits the extent to which scientists working in the grassland and allied animal husbandry fields can have personal contact by overseas visits with their fellow-workers in other countries; and, vice versa, the extent to which overseas workers can visit us and see what we are doing in our laboratories and research stations and on our farms. Only meetings and discussions in the actual field of operations can be of the fullest benefit to both the visitors and those who entertain them.

I am sure New Zealand farmers would want me to extend to visitors to the congress a warm welcome on their behalf and an invitation to accept every opportunity during their visit to meet them in factory, laboratory, research institution, and on the farms so that the fullest reciprocal advantage can be gained from their stay in New Zealand.

Welcome and Best Wishes

The Government is proud to act as hosts to the many distinguished scientists whose work is in a field of such consequence to this country. I would like to express my appreciation of the great amount of work that has been done by our own scientific and extension personnel in the organisation of the congress and to wish those taking part in the proceedings enjoyable and advantageous meetings and discussions and an equal share in the advantages, both immediately and in the future, that will undoubtedly result from such an important occasion in the development of our knowledge of that most important of crops, grass, and the animals that graze it.

K. J. HOLYOAKE, Minister of Agriculture

The Home Orchard in Summer

SUMMER is not the busiest period for the home orchardist, but there are routine jobs, such as spraying, cultivation, and keeping an ever-ready eye for the appearance of pests and diseases. In this article S. P. Money, Horticultural Instructor, Department of Agriculture, Wellington, discusses these points and the treatment of grassed-down orchards.

[*National Publicity*

MOST important of the summer tasks is continuation of spray programmes. Pests and diseases are most active in summer and unless a continuous protection of spray material is provided, damage to crops will result. A complete spray programme for the home orchard was included in the August "Journal".

Red Spider Mite

Some pests are not fully controlled by the normal spraying programme and a careful watch should always be kept for these. One such pest which is a considerable nuisance is the red spider mite. This tiny sucking insect, which multiplies extremely rapidly, is first apparent by the reddish tinge, along the main ribs and veins of leaves of apples, pears, peaches, raspberries, currants, gooseberries, and strawberries. It is usually underneath the leaf at first, but later as the infection becomes worse it is seen on both sides of the leaf and on the leaf stalk.

On trees affected with this pest the leaves have an unthrifty, dry appearance and new growth is gradually reduced. Unless special measures are taken during summer a large mite population will overwinter on the tree as eggs, which are more difficult to control than the adult stage.

Control

New sprays now available give satisfactory control of the mite. Three of these compounds which can be used in summer and are satisfactory for home garden use are aramite, chlorbenside (sold as "Chlorocide"), and chlorfenson (sold as "Ovomite").

Scale Insects

Scale insects, because of their protective covering, are not easy to eliminate and though they are best attacked during winter, some measures can be taken against them in summer. These insects are recognised by the horny protective covering which shelters the adult insect and its eggs. Scales occur in a large range of shapes and sizes.

One of the commonest is the mussel scale seen on apples and pears. The name is an indication of the mussel shell shape of this scale. The adult insect occupies the narrow end of the shell and later in the season eggs are laid in the wider, rear part. The mussel scale can become extremely thick on branches of its host, being responsible for losses of crop and weakening of growth, but it seldom causes death of the tree.

The San Jose scale is another common pest in New Zealand. This insect has a tiny, round, black or grey covering. It is found on limbs or twigs, but occurs also on the fruit of apples and pears, on which it causes reddish areas with scales as their centres.

Citrus trees are hosts to a wide range of scale insects. Among them is the olive scale, which is black or brownish; it is a large scale about ⅛in. long and is characterised by a raised H marking. Leaves of trees infested with this scale are usually blackened with sooty mould fungus.

The soft wax scale and hard wax scale of citrus infest twigs. Mature scales are tent shaped and white, appearing like blobs of candle grease. The young scales are star shaped.

The cottony cushion scale appears with the scales mentioned above on citrus and on pears. This scale is more noticeable than the other scales because of its large, white, corrugated egg sac. This sac, which may grow to two and half times the length of the adult scale, gives a soft cushion-like appearance.

Control

White oil sprays are used to control scale insects in summer. White oil is an emulsified oil which can be mixed with water. When applied to fruit trees the fine film of oil lasts 2 or 3 days and this is sufficient to suffocate the scales. Generally 1/3 pint of white oil to 4 gallons is the strength to apply, but directions supplied with proprietary sprays should be followed carefully, as the oil content of brands may vary.

Care of Grassed Orchards

Many home orchards are grassed and trees are often planted in lawns. These practices have many advantages,

but some disadvantages. Whether the orchard is to be grassed eventually or not it is advisable to cultivate the soil for the first 3 or 4 years.

Especially when standard trees are used, the spacing between trees allows cultivation of some of the ground as a vegetable garden. In districts with deep loam soils vegetables or strawberries can be grown between trees permanently, but where soils are shallow the continued deep cultivation required for vegetables will damage the roots of fruit trees forced near the surface in shallow soil. Under such conditions grassing down is an advantage, provided the vegetables can be grown elsewhere.

Often, however, a grass sward has a depressing effect on young trees in the first 2 or 3 years, but this can be overcome readily by applying a slightly larger amount of nitrogenous fertilisers than would be adequate for working into the soil round trees.

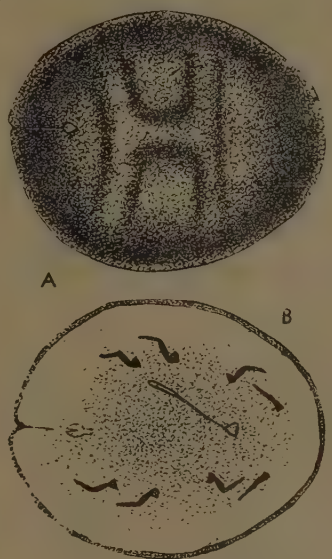
After two or three seasons trees should show improvement of growth due to adjustment of the tree roots to grass competition, release of nutrients by the grass, and improved soil structure through both the earthworm channels and the effect of the grass root system. Good soil structure promotes good drainage and better retention of moisture.

Seed mixtures for grassing down should include some clovers, as these help to build up the amount of nitrogen available. A suitable mixture is: 4 parts by weight of chewings fescue, 2 parts of browntop, and 1 part of white clover. This mixture may be modified to suit variations in climate.

Autumn sowing is recommended, as it allows the grass to become established after the main growing period of the trees and minimises competition for soil nutrients between the trees and the establishing grass. Any late crops from established trees can be

Common Scale Insects

Adults (left) and star-shaped young (right) of the hard wax scale on citrus.



[*Department of Scientific and Industrial Research*

Olive scale. A—Upper surface of scale; showing raised H marking. B—Under surface of the insect, showing legs and central proboscis for sucking sap.

[*Department of Scientific and Industrial Research*

Cottony cushion scale. Note the large, white, corrugated egg sac on the single scale at left.

[*W. Barnard*

Adult soft wax scales on twig, showing the waxy covering on the insects.

harvested without excessive trampling of the newly sown grass by using boards to walk on. Spring sowing of the grass may be satisfactory for young trees, which do not shade the ground much. The grass must be mown regularly to avoid competition between trees and grass for moisture during dry weather.

SMALL FRUITS

The following are some of the jobs and problems encountered during summer in the growing of berry fruit and sub-tropical fruit in New Zealand:—

Raspberries

When the raspberry crop is completed the spent canes should be removed to eliminate diseases and pests. Such attention will enable the canes selected to carry next season's crop to be fully exposed to sunshine, which will assist materially in ripening them, and food supply will be diverted to the remaining canes.

Bud Moth

The raspberry bud moth is often the primary cause of crop failure, the larvae damaging growing canes, dormant buds, fruiting laterals, and fruit.

Control: Especially where bud moths are numerous is it advisable to prune out the canes which have fruited as soon as the crop is finished. If the canes are then burnt immediately, moths which have hatched later in the season and laid eggs on the lower buds on the canes will have been destroyed. Whether pruning is done or not, all canes should be sprayed immediately after harvest with arsenate of lead (1½oz. of arsenate of lead and 2½oz. of hydrated lime in 4 gallons of water) or DDT (½oz. of 50 per cent. wettable powder to 4 gallons of water).

Red Spider Mite

Red spider mite can be controlled as described earlier.

Fungous Diseases

Cane spot is a fungous disease which has become serious in some areas. The spores from fructifications on fruiting canes infect new canes early in spring. In the early stages lesions appearing on the young canes are small, scattered, and purplish, but as they spread they become greyish white pits with purple edges.

The most common indication of the disease is extensive greyish depressions on the canes, most conspicuous on the sunny side. The grey appearance is due to the uniting of many small infections, and in advanced stages canes appear irregularly blotched and often girdled. When such cankers occur cane growth may be reduced. Infected buds fail to develop fruiting laterals the following year and yields are reduced. Sometimes severe cracking of the canes occurs and the pith is exposed. The purplish spots also appear on leaves and leaf stalks, causing curling of the leaves and the dropping out of diseased areas, giving a "shot-hole" effect. Infection may spread to the ripening fruit, causing malformation due to sections of the berries failing to mature. Spores overwinter on old canes and are spread to new canes by wind and rain throughout the growing season.

All infected canes should be removed and burnt and clean conditions should be maintained about the plants. Adequate thinning of canes in the stools to improve ventilation and the elimination of stubs by pruning to ground level will do much to assist control by spraying. Spraying must be thorough on all canes from base to tip; on fruiting canes to kill the spores produced in fructifications and on young canes to protect them against infection from spores.

Spray with bordeaux mixture. To make 4 gallons use 4oz. of bluestone and 5oz. of hydrated lime to 4 gallons of water. Prepared bordeaux powder may be used at a strength recommended on the package.

Leaf spot: This fungus causes circular spots on the leaves and sometimes on the canes. The spots are reddish brown at first, but later spread and change to grey. When infection is severe there may be heavy premature defoliation, which will cause a stunting of the new canes. The fungus overwinters mainly in fallen leaves and sometimes on canes.

The disease can be controlled by spraying with bordeaux as for cane spot.

Rust, a fungous disease, is confined to North Island areas as yet, but has spread since it was recorded in 1945. Infection is usually not noticed until the yellow groups of spores occur on the under sides of leaves in early summer. An earlier stage of infection occurs on the upper surfaces of leaves. In autumn the yellow spore stage changes to black spores and the leaves have the appearance of being covered with soot particles. The fungus overwinters on fallen leaves and attacks the young leaves early the following spring.

The destruction or digging in of all infected leaves in autumn should reduce reinfection in subsequent years. Canes should be sprayed with lime sulphur plus colloidal sulphur after the fruit has been picked and at leaf fall. To make 4 gallons use 3 fl. oz. of lime sulphur, 1 fl. oz. of colloidal sulphur, and 4 gallons of water.

[Green and Hahn

A good crop of raspberries on a Lloyd George cane.

Currants

Summer pruning of currants may be practised in the home garden where particularly good berries are desired.

Overcrowding of young shoots on black currants in summer may retard the ripening of the crop. When this is likely to occur the young shoots should be moderately thinned in early summer by removing some of the weaker ones. However, any excessive reduction of foliage may be detrimental, as it reduces the food-producing ability of the plant. Care must

be taken also to avoid shortening shoots which are to be retained to fruit the following year.

To encourage growth of spurs on red and white currants summer pruning is recommended. Young side shoots should be shortened to about five buds in summer and further shortened to two or three buds in winter, thus creating spurs. Summer pruning in this manner causes the remaining buds to develop better and produce better fruit the following season.

Harvesting

Fruit does not achieve its best flavour unless fully ripened on the bush. Fruit should not be picked when moist with dew or rain. If red currants are desired over a long period, late crops may be obtained by growing a few bushes in the shade of a wall or fence.

Diseases and Pests

San Jose scale, mussel scale, and red spider mite all attack currant plants and may be dealt with as described earlier.

Leaf spot: Two leaf-spotting fungous diseases attack currants and can cause yellowing of leaves and defoliation. A summer spray of bordeaux mixture (6½oz. of bluestone and 5oz. of hydrated lime to 4 gallons of water) should give good control.

[*Rendell's*

A 4-year-old Chinese gooseberry vine infected with crown gall.

Strawberries

Summer is the busiest period for strawberry beds. Most varieties are harvested during summer and symptoms of various pests and diseases attacking strawberries are most apparent then. Where plants are to be used for runner production a close watch must be kept to ensure that the plants selected for propagation are the best available. It is not good practice to take runners from fruiting plants, but this is common in home gardens. Plants which are to be allowed to grow runners in autumn should be selected during fruiting. Those which are disease free and carrying heavy crops of good-shaped berries should be chosen.

A careful check should be made for virus diseases which show up as crinkling of young leaves accompanied by yellow areas and general dwarfing of plants. There is no control for virus diseases in strawberries and infected plants should be burnt as soon as the infection is detected. The spread of virus diseases may be reduced by the control of aphids, which transfer the diseases, by spraying with nicotine sulphate (4/5 fl. oz. plus 2½oz. of soft soap to 4 gallons of water).

Fungous Diseases

Leaf spot: This is the most common disease of strawberries in New Zealand. It is not serious, but may restrict the growth of plants if uncontrolled. It is controlled by bordeaux sprays applied during spring, summer, and autumn at a strength of 4oz. of bluestone and 5½oz. of hydrated lime to 4 gallons of water. Bordeaux should be applied as soon as plants have finished cropping.

Grey mould: This mould attacks the fruit during wet weather at the time of ripening, and the spread of the fungus may cause severe losses in gardens where the fruit is in contact with the soil. Usually it is not serious in beds that have been well mulched. Spores remain on the soil surface, and under favourable conditions these germinate and spread to other parts of the plant.

Control of grey mould is assisted by a straw mulch to prevent the fruit touching the soil. When infection occurs care should be taken to pick clean fruit and affected fruit separately. All infected fruit should be picked, burnt, or buried deeply. Do not put infected fruit in any container with sound berries, as the fungus spreads rapidly and will affect all fruit in a container in a very short time.

Root rot (red core root rot): This fungus invades the root tips and grows into the core, which becomes reddened. Plants infected with this disease become debilitated, wilt, and often die. The severity of the disease depends on the moistness of the soil, being most severe in wet soil. Infection can be recognised most readily during winter. Roots should be cut with a knife and examined for red core symptoms. The fungus can remain alive in the soil for several years and strawberries should not be replanted in soil where previous infection has occurred.

Chinese Gooseberries

Summer care of Chinese gooseberries is restricted to cultivation and disease control. Chinese gooseberry vines have extensive root systems and as the fibrous feeding roots are near the surface of the soil, they may be easily damaged by the careless use of implements. Cultivation should be shallow, but sufficiently deep to control weed growth and so conserve soil moisture during hot weather.

Leaf-roller Caterpillar

The leaf-roller caterpillar is one of the few insect pests attacking Chinese gooseberries and can cause considerable damage to the fruit if control measures are neglected. The grub is active during late December and early January, when it attacks berries, usually where two or more are in contact. Frequently it eats a hole through the skin into the pulp, but more commonly it makes shallow burrows of

scarred areas on the surfaces of the fruit, causing blemishes and a tendency for the fruit to drop prematurely.

Control of these caterpillars is obtained by spraying with a mixture of 1oz. of arsenate of lead and 2oz. of hydrated lime to 4 gallons of water. Because of the hairiness of the leaves and fruit a wetting agent, such as household detergent, should be included in the spray at 1 teaspoon to 4 gallons.

Thrips

Thrips are sometimes a nuisance, causing silvering or browning of the leaves. Control may be obtained by spraying with 50 per cent. DDT (1oz. to 4 gallons of water).

Crown Gall

Crown gall in Chinese gooseberries is invariably associated with plants that have been propagated by root grafting or cutting. In these plants infection occurs at the graft union or wound surface and takes the form of a large, more or less circular, wart-like knot, sometimes up to 4in. in diameter. When a plant is purchased it should be inspected carefully for galls at the graft union. As this disease affects other plants, it should not be introduced into the garden.

Tree Tomatoes

The two main types of tree tomatoes are the yellow, which is the oldest in cultivation, and the red. There are also many hybrids. Tree tomatoes are shallow rooted and may be severely damaged by deep cultivation. Frequent shallow cultivation during summer to control weed growth and so preserve available moisture is all that is necessary.

[L. H. Wright
Tree tomato showing typical virus markings.

The fruit of tree tomatoes is borne on wood of the current season and it is necessary to keep trees in a vigorous condition. Regular applications of fertiliser are desirable. The quantity varies with soil type, but 3lb. to 5lb. of blood and bone per year is usually sufficient to maintain a bearing tree in good condition.

Powdery Mildew

Powdery mildew is the most common disease of tree tomatoes. It appears as greyish-white powdery patches on the under sides of the leaves. Later the fungous spreads to the upper surfaces. If the disease is not controlled, it can lead to widespread defoliation. Control is achieved by spraying with 1½oz. of colloidal sulphur and ¾ pint of lime sulphur to 4 gallons of water.

Virus Diseases

Tree tomatoes are affected by various types of virus diseases. Symptoms show as dark mottling of the foliage and dark blemishes on the fruit. One of the viruses causes the pips to become very hard.

Looper Caterpillar

Looper caterpillar may cause leaf injury by eating large, irregular holes in the leaves. The pest can be controlled by spraying with 50 per cent. DDT (½oz. to 4 gallons of water).

Two Methods of Twitch Control

By P. B. NEWELL,
Instructor in Agriculture, Department of Agriculture, Ashburton

THERE are two main methods of twitch control—by cultivation alone and by the use of chemicals in conjunction with cultivation.

THE fundamental approach to the control of "old man" twitch (*Agropyron repens*), browntop (*Agrostis tenuis*), onion-rooted twitch (*Arrhenatherum elatius* var. *bulbosum*), and creeping fog (*Holcus lanatus*) is crop rotation and summer fallow. The best rotation is one which begins with a summer fallow and ends with a summer fallow and provides for the growing of fodder crops rather than cereals.

The problem is best attacked when the area is first broken out of old grass, when all the twitch will be in the top few inches of turf.

Old man twitch and dryland browntop are best skim ploughed 2in. or 3in. deep in late spring and this furrow turned back about a month or 6 weeks later with further turnings at intervals throughout the dry summer weather.

This method relies on exposure and shrinkage for a kill and is usually better than the method of skimming and cross skimming followed by grubbing, as the twitch is killed where it lies rather than being dragged about the paddock.

For onion-rooted twitch advantage should be taken of the effect of frost on the bulbs and for this reason skim ploughing should be done in June or July with further cultivation in summer, as for old man twitch.

Creeping fog with its deep underground stems requires cultivation with the grubber, and the rotation should include a succession of summer fallows and fodder crops such as turnips or greenfeed.

Clay Downs Browntop

Browntop on clay downs is best controlled by the smother method of deep ploughing to 6in., using skimmers, and then rolling or light discing to seal the furrows. Cultivation in preparation for the smother crop should leave the browntop turf undisturbed, as should cultivation for the crop following the smother crop. The twitches are low-producing grasses which have no place in pastures and every effort should be made to eradicate them.

Chemical Control

With the use of chemicals cultivation is still essential, but the cultivation practice varies widely from the normal methods. The first step is to plough, rotary hoe, and then apply 15lb. to 20lb. of TCA per acre. The TCA should be applied when the soil is moist and further rain is expected. After the rotary hoeing a brassica or potato crop could be sown or planted. If this is done, the TCA application should be made immediately the crop is put in.

Comparison of Methods

In the cultivation method control depends on a dry summer, and in the normal season complete control is not achieved. The land is out of production for a period and if the season has been so dry that good twitch control has been achieved, there is often insufficient moisture left in the soil for the subsequent crop.

With the chemical method the land is not out of production and twitch control is more positive, provided the chemical is applied just before further rain falls. Applied under favourable conditions, the above rate will also give good control of other weeds such as fat-hen, willow weed, cornbind, and annual grasses. In chemical treatment the best results are obtained by rotary hoeing, whereas discing is slightly less satisfactory.

Phalaris as Special-purpose Pasture on Dairy Farms

By G. A. BLAKE,
Instructor in Agriculture, Department of Agriculture, Matamata

THOUGH *Phalaris tuberosa* has been grown in New Zealand for about 50 years, only during the last few years has interest been focused on it as a pasture plant on good dairy land. Before that efforts to establish it in a mixed sward generally resulted in failures from the competition of quicker-establishing grasses. Recent sowings with clovers only have indicated that this grass may have a place as a special-purpose pasture on dairy farms.

PHALARIS is a tall-growing perennial grass and grows well in moist conditions, but will also stand dry conditions better than most grasses. It produces most during late winter and early spring, but its summer production is also not insignificant.

Early Management

Phalaris requires special management to establish it, as it is very slow growing after germination and cannot tolerate competition from quicker-growing grasses or weeds. In its early stages of growth the stems arising from the swellings are easily detached; hence the stand must not be grazed until late September or early October, when it is cut for silage, by which time it has attained a height of 2ft. or more.

Recovery after cutting is often slow, but by the time the aftermath is about a foot high extra roots have developed on each stem at ground level. These anchor the stems to the ground and grazing can then be permitted. Subsequent grazings should be at the 8in. stage, but hard grazing in the next winter does not affect the stand.

The lack of early grazing, the shutting up for silage, and the subse-

Phalaris seed heads.

▲ When the phalaris was cut for silage it was 3ft. high, dense and leafy, with both red clover and white clover present in desired quantities.

▲ Phalaris is very leafy.

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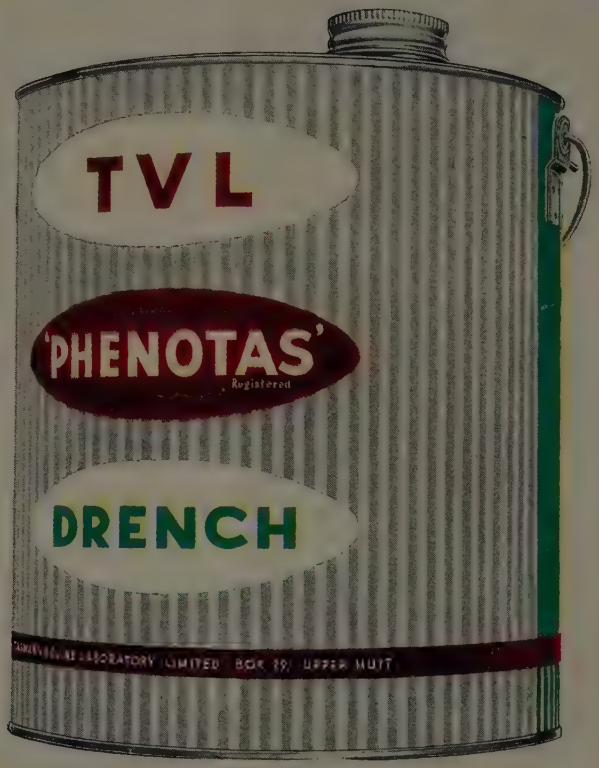

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quent spelling do not depress the clover as would be expected. Phalaris grows so slowly in the first few months of its life that there is insufficient growth to retard the clover, which is subjected to shading for only a short period immediately before harvesting for silage.

As annual weeds, if thick enough, can affect the establishment of phalaris, sowing should be restricted to autumn, when fewer weeds germinate. Phalaris establishment is summarised as follows:—

1. Prepare a fine, firm, weed-free seed-bed, preferably after a summer crop, as for a permanent pasture.
2. Sow 10lb. of *Phalaris tuberosa*, 3lb. of cowgrass, and 2lb. of white clover early in March with 3cwt. of superphosphate or serpentine superphosphate.
3. Allow the crop to grow until early October; then harvest it for silage.
4. Topdress with superphosphate, and potash if needed, as soon as the crop has been removed.
5. Spell the paddock until the aftermath is about a foot high.
6. Feed off this growth, using the electric fence for controlled grazing.
7. Spell after each grazing until the growth is about 8in. high.

Once established, phalaris may be used for either hay or silage, providing a material that has a high percentage of very palatable leaf. It has been used to control tall fescue on drain banks between the drain and the fence where stock are excluded. Mature plants can be transplanted to this area, or the rubbish can be burnt off in March and phalaris seed sown among the ashes. It establishes well under these conditions and gradually pushes out the tall fescue.

Value as Pasture Plant

An indication of the value of phalaris as a pasture plant in conjunction with red and white clover can be obtained from the following grazing record of a 4-acre paddock of this grass grown in the Matamata district.

In March 1954, 8lb. of phalaris, 3lb. of cowgrass, and 2lb. of white clover per acre were sown with 3cwt. of serpentine superphosphate after a crop of white-fleshed turnips. Six and a half months later, on 11 October, the paddock was cut for silage when the phalaris was over 2ft. high. Two hundredweight of serpentine superphosphate and 1cwt. of muriate of potash were applied a few days after harvesting. Five weeks later the aftermath was over a foot high and under strip grazing lasted 50 cows for 36 days for 1 hour daily.

At the end of December the paddock was topped to prevent seed formation. Both the phalaris and the cowgrass

made rapid growth after topping, and from the middle of January 1955, when there was a drought, the paddock fed 50 cows for 33 days under strip grazing, the last breaks being 2ft. high.

A month later, still under drought conditions, the phalaris had recovered enough to be grazed again, and on 1 April was topdressed and closed for autumn-saved pasture. At the beginning of July this growth was over a foot high. This was fed off by 30 dry cows in 5 days. It was then spelled for 2 weeks and from 1 August it carried 40 milking cows for 8 days, under day grazing only.

Between 9 August and 16 September the phalaris grew a foot high and strip grazing began with 47 cows for ½ hour daily, but after 9 days the unused portion of the paddock had grown to 2ft., and this 2¾ acres lasted 49 cows for 8 days. The paddock was closed for silage on 8 October and by 14 November, when it was cut, the grass was 3ft. high, dense, and leafy with both red clover and white clover present in desired quantities.

The high production of leafy, palatable fodder produced on this and other areas justifies recommendation of the use of *Phalaris tuberosa* as a special-purpose pasture on dairy farms in Matamata district.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during December as follows:—

1YZ Rotorua, 7.15 p.m.

6 December—"Milking Shed Hygiene", by M. J. McFetridge, Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton.

2YZ Napier, 7.10 p.m.

4 December—"Spelling Pastures for Clover Reseeding", by A. J. Coughlan, Fields Instructor, Department of Agriculture, Hastings.

18 December—"Seed Harvesting", by F. H. Collin, Fields Instructor, Department of Agriculture, Hastings.

2XA Wanganui, 8 p.m.

6 December—"For the Country Woman", by Mary Macdonald.

13 December—"The Radio Vet", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

20 December—"Crop Failures", by G. R. Moss, Fields Instructor, Department of Agriculture, Wanganui.

2ZA Palmerston North, 12.33 p.m.

3 December—"Handling Stock for Slaughter", by J. W. Turnbull, Meat Inspector, Department of Agriculture, Longburn.

10 December—"Preparation of Irrigation", by J. O. Brasell, Farm Machinery Officer, Department of Agriculture, Palmerston North.

17 December—"Prevention of Potato Tuber Moth in the Home Garden", by G. N. Paulin, Horticultural Inspector, Department of Agriculture, Palmerston North.

24 December—"The Cooling of Milk and Cream", by K. A. Martin, Special Inspector, Department of Agriculture, Palmerston North.

31 December—"The Need for Specially Trained and Equipped Field Drainage Contractors", by K. L. Mayo, Instructor in Agriculture (Farm Drainage), Department of Agriculture, Palmerston North.

3YA Christchurch, 12.20 p.m.

3 December—"Chemical Control of Sweet Brier", by A. R. Dingwall, Fields Superintendent, Department of Agriculture, Christchurch.

17 December—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

3 December—"Stock Health", by C. E. Isaacs, Veterinarian, Department of Agriculture, Invercargill. "Dry Land Farming Practices", by W. A. Lunn, Fields Instructor, Department of Agriculture, Dunedin.

10 December—"Control of Grass-grub", by D. L. Walker, Instructor in Agriculture, Department of Agriculture, Balclutha. "Lamb Management", by I. M. Cairney, Veterinarian, Department of Agriculture, Dunedin.

17 December—"Ryegrass and Cocksfoot Harvest", by J. G. Richards, Instructor in Agriculture, Department of Agriculture, Oamaru. "Review of 1956", by A. G. Elliott, Fields Superintendent, and D. H. Le Souef, Livestock Superintendent, Department of Agriculture, Dunedin.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7 p.m. (Bay of Plenty country journal, Pig Council talk on fourth Wednesday of every other month at 12.33 p.m.), Thursdays at 12.33 p.m. (news for the farmer).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m. Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

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SHEEP DIP

Use of Electric Fences for Run Cattle

By H. McM. BULL,
Instructor in Agriculture, Department of Agriculture, Hamilton

MOST farmers have of recent years appreciated the value of electric fences for enforcing more rigid control of pasture growth and the consumption of feed by run cattle. Full yield can be obtained only when pastures are spelled between grazings. Subdivision therefore is essential if that feed is to provide an adequate ration throughout the year and particularly in winter and early spring.

WITH the use of a mobile electric fence, clean rationed grass can be made available, extending the grazing value of a paddock by many weeks. Dry country in good heart, water, and an adequate run-off on which to feed hay and hold stock in wet weather are essentials. Should the block be a large one with few gates, it will be necessary to feed off from either end. Where labour is available another electric fence can be used to wire off the areas already grazed.

Run cattle as a rule if handled quietly soon settle down and respect an electric fence. Occasionally, odd beasts will ignore fences of any kind, and these must be withdrawn from the mob before they lead others into the same habits.

Cattle should never be left on at night, for if wet weather sets in, not only may the area be converted into a sea of mud, but the fence may be carried away by restless cattle looking for shelter or impatient to graze fresh pastures.

As an alternative to grass a crop of Algerian oats can be of considerable value to ensure the steady development of young cattle throughout winter. Sown in autumn at from 2½ to 3 bushels to the acre and rationed with the electric fence, it will provide a large bulk of useful feed from May to October and can finally be shut up for hay or silage.

A run-off should be provided for the feeding out of hay at the rate of 1 bale per day for every 8 yearlings in order to provide roughage and maintain a balanced diet.

The area of 10 acres illustrated had Algerian oats broadcast and disced in at only 2 bushels per acre on 1 March after a turnip failure through drought. Fifty yearlings were break grazed from 1 July to mid-August when an additional 25 2-year-olds were run in, cleaning up the area by 10 September, when it was closed for hay.

The break system adopted was to divide the paddock in halves, alternating each half with the run-off of 25 acres, and hay was fed every other day with 1 bale to every 7 head. During wet weather the cattle were held off the crop and compensated with extra hay.

On 10 December the oats were cut for hay and yielded 650 bales.

Cattle break grazing a crop of Algerian oats.

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Bacteriosis, a Disease of Cocksfoot

By MARGOT E. H. JOHNSTON,

Senior Seed Research Officer, Department of Agriculture Seed-testing Station, Palmerston North

A BACTERIAL disease of cocksfoot which has been recognised for many years in Europe also occurs in New Zealand. It is bacteriosis or Rathay's disease, which in Europe appears in a more severe form than it does in New Zealand. From investigations made so far it is thought that the disease would be of minor importance in reducing cocksfoot seed yield in New Zealand.

IN an account of the disease by overseas workers the most general symptoms were the presence of yellow droplets of bacterial slime at the bases of the spikelets, the lower parts of the stem being straight and clean. Badly infected plants were described as having leaves and stems stuck together by a copious yellow slime which prevented the emergence of the inflorescence.

At a later stage shoots of such plants were wholly destroyed, leaving a dried-up, brown residue. In other inflorescences the upper parts were covered with slime and much contorted. Not in any instance were the basal parts of the plant diseased, nor was any stunting noticeable; the plants were tillering in the normal way. However, another authority records killing out of patches of cocksfoot, severe stunting, and little or no tillering.

Disease Observed at Milson

In New Zealand the disease has not appeared in such a severe form, though instances of panicles being covered by bacterial slime have been recorded. On a cocksfoot seed production trial at Milson, near Palmerston North, varying degrees of withering and distortion were observed last October and November on cocksfoot panicles as they emerged from the leaf sheaths. The condition was identified as a stage in Rathay's disease.

The effect of the disease was to cause destruction and distortion of the developing spikelets. Frequently the basal stems of the panicles would appear to be brown and almost bare and show only traces of brown, withered glumes. The degree of attack varied, as at other times only the lower spikelets on a stem would be destroyed or alternatively the tips of the upper stems of the panicles would be barren. In affected inflorescences the main axis and stems were usually very crinkled. Later extremely abnormal panicles appeared with elongated outer glumes and branched spikelets.

In the accompanying illustration varying stages of infection may be seen. Panicles Nos. 1 and 2 show the severe form with much damage and some elongation of outer glumes. In Nos. 3 and 4 there is less damage, but some destruction of the spikelets and crinkling of the stems. No. 4 shows branching of the spikelets. No. 5 is an apparently normal, healthy cocksfoot panicle.

Classification of Groups

To estimate the amount of infection on the plots in the Milson trial random samples of 100 heads were collected and classified into four groups as follows:—

1. Apparently free from disease (No. 5).
2. Trace to slightly infected (No. 3).
3. Moderately infected (No. 4).
4. Severely infected (Nos. 1 and 2).

After the disease in the trial area at Milson had been found it was decided to carry out a survey of cocksfoot seed crops throughout the seed growing areas. Samples were collected at random from crops and were examined for the presence of disease. They were classified into the four groups, as were the samples from the Milson trial.

Of the 65 crops sampled only 4 did not show any trace of infection, 10 samples contained 0.2 per cent. of panicles moderately infected, and only 1 sample contained one severely infected head. In the 65 samples examined the average percentage of heads which showed a trace to slight infection was 6.5.

Beyond the loss of a proportion of spikelets in which seed would have been formed it is not possible to determine the effect of the disease on seed yield.

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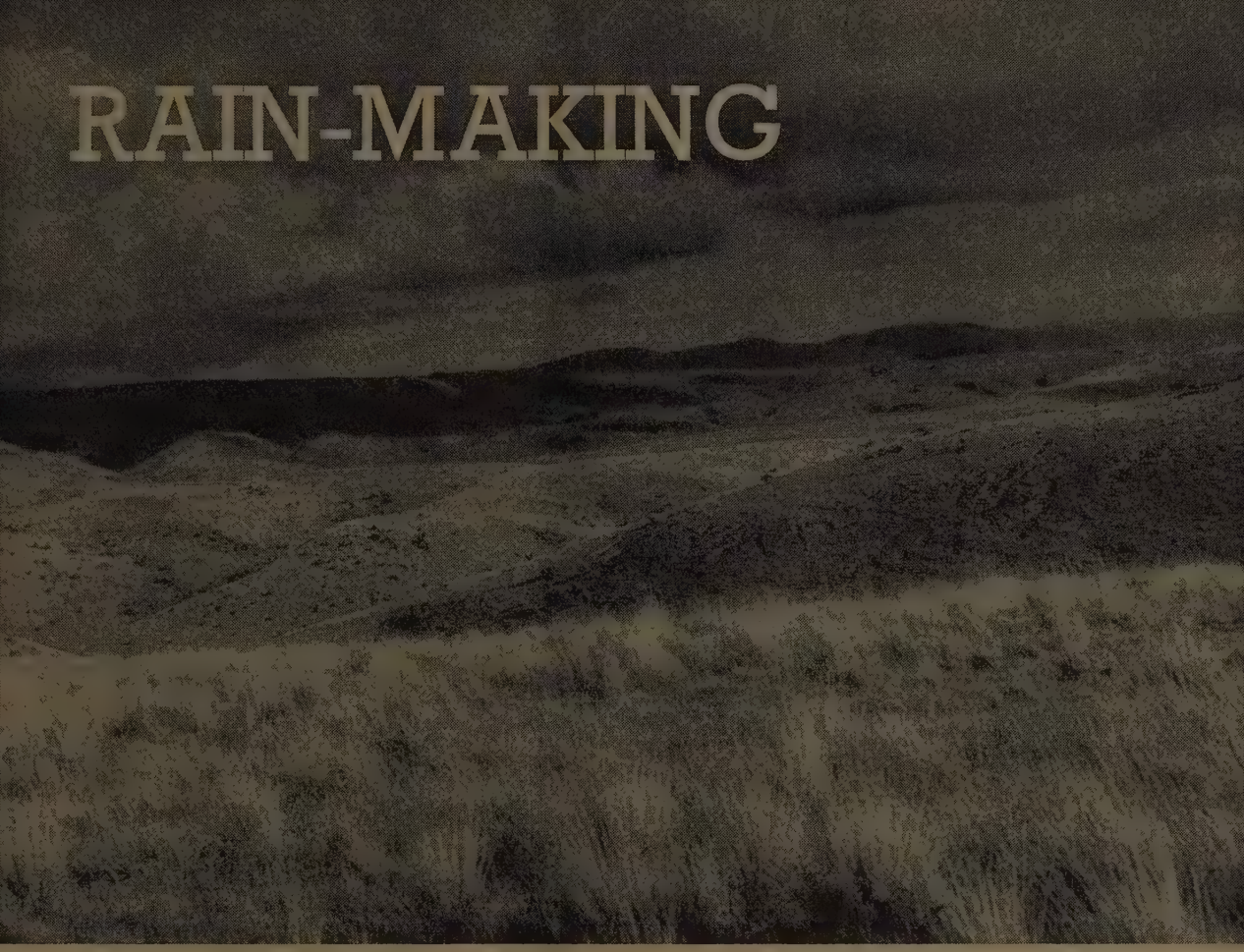
RAIN-MAKING



Inconclusive Results of Cloud "Seeding"

RAIN-MAKING—man's attempt to induce clouds to precipitate rain that might not otherwise fall or to make it fall in a particular area—has been investigated fairly intensively in some agricultural countries overseas in recent years. The aerial "seeding" of clouds with chemicals practised today is a long step from the mumbo-jumbo of the rain-makers of primitive African tribes, but both are a reflection of man's dissatisfaction with the natural dispensation of rain, a primary essential in the practice of agriculture.

THOUGH no official experiments have been conducted in New Zealand, meteorologists here have kept themselves informed on research overseas. In America rain-making businesses have been operating for some time, and occasional Press reports of their activities have stimulated inquiry in New Zealand. Official experiments in Britain are described in the article which follows by B. C. V. Oddie, Assistant Director for Physical Research in the British Meteorological Office, reprinted from "Agriculture" (February, 1956), the official journal of the United Kingdom Ministry of Agriculture, Fisheries, and Food.

The rain-making experiments carried out on Salisbury Plain last autumn have given rise to a good deal of misunderstanding in the public mind. The only expected effect of cloud seeding is a slight increase in the natural rainfall over a small area. It is extremely unlikely that rain can be induced where it would not otherwise fall.

The recent announcement that experiments on the artificial production of rain had started in this country elicited a wide variety of reactions; but the commonest was to ask why in so wet a country more rain should be needed. The craft of rain-making, however, was born and developed in America, and in that country few were troubled by such doubts; for "the West", which accounts for nearly half of the country, is an arid land where lack of water is the main obstacle to development. The power to increase rainfall even slightly would obviously be of incalculable value in such conditions.

Basis for Research

The pioneers of rain-making were the General Electric Company, who assembled a brilliant research team at the end of the war to study the problem. Their starting point was the work of a Swedish meteorologist, Bergeron, on the formation of rain-

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drops. That raindrops are formed from cloud is obvious. But a cloud is composed of minute droplets of water so small that they can float in the air almost indefinitely. How are these particles gathered together to form a raindrop? Some quite powerful mechanism is evidently required, for an average raindrop is equivalent to about a million cloud particles.

At that time Bergeron's opinion was that appreciable amounts of rain were possible only if the top of the cloud were at a temperature well below freezing point. One might suppose that as soon as the cloud reached a temperature of 32 degrees F. all the little droplets of which it it is composed would freeze, but in fact they do not do so at all readily. A natural cloud has usually to be cooled to something like 3 degrees F. (or 29 degrees below freezing) before appreciable numbers of ice crystals appear. As soon as they are formed, however, these ice crystals begin to grow quite rapidly, at the expense of the still-liquid droplets near them. They can, in fact, grow large enough to yield a fair-sized raindrop within half an hour. There is a complete physical explanation of this growth, though it is too long to be given here.

Bergeron used this process to account for the formation of raindrops. Almost all raindrops, he suggested, begin as ice crystals, and though other ways are now known in which rain can be formed, it is reasonably certain that rain does often originate in this way. Now, this at once suggests a way of making rain, for ice crystals do not readily form in a cloud. Anything that helps them to do so should, it seems, increase the rainfall.

From this line of thought the idea of rain-making developed. The obvious way of applying the principle is to fly above a suitable cloud and drop some very cold material into it. Pellets of "dry ice" (solid carbon dioxide) are normally used, and some very striking results can be obtained in this way. But an aircraft is expensive to operate, and it seeds only a narrow strip of cloud above which it flies. It soon became evident that this method was not economically satisfactory. What was wanted was some way of seeding a much greater area of cloud without the use of aircraft.

Use of Silver Iodide

The G.E.C. research team believed that they had found the answer in silver iodide. Even the minutest crystals of this material when introduced into a super-cooled cloud cause ice crystals to form, and it was found that silver iodide crystals could be produced in enormous numbers by means of very simple and inexpensive generators. All that was necessary, then, was to set up a few generators in a suitable place and leave the natural air movements to carry the crystals up into the cloud. Calculations suggested that the amounts of silver iodide needed would be quite small, and the whole operation was so cheap, and the area which could be treated so large, that even a small increase in rainfall would justify the outlay.

Against this a number of formidable arguments can be raised. It is not certain or even very likely that in general particles released from the ground will find their way in considerable numbers to a height of 8000ft. or more. Even more important is the question whether there is really much additional water to be got out of the cloud.

A system of rain clouds is a water-producing organisation. Air flows continuously into it from below and out at the top, leaving most of its moisture behind. Thus the cloud system has an income (the moist air) and an expenditure (the rainfall), and it has a certain amount of water in reserve, which forms the visible cloud. The seeding technique does nothing to increase the income; it merely increases the expenditure by drawing on the reserves. Obviously this can serve only for a short time, and afterward expenditure would have to be reduced to enable the reserves to be built up again.

In other words, if one area gets more rain by seeding, the next area over which the cloud passes may well get less. But the immediate point is that the reserves in the cloud are remarkably small, and it is far from evident that it is possible to get a significant increase by merely drawing off a part of the reserves.

Results Not Sensational

Nevertheless several American commercial rain-making firms have been operating for some years with this technique, and government services in many parts of the world have also been experimenting with it. The results of this considerable body of work have not been very sensational. They are perhaps best summed up in the words of an impartial committee of investigation appointed by the World Meteorological Organisation.

This body, speaking in 1954 of rain-making in general, said: "Operations which have been carried out so far have produced results which could be termed, at best, inconclusive. Present-day techniques . . . have very little value, if any, in augmenting precipitation in areas of very low rainfall or during dry periods."

It is, as a matter of fact, extremely difficult to know whether one has produced any effect by seeding from ground generators. It is useless to attack a cloud unless it is at least 5000ft. thick and has a temperature well below freezing point at its top. But a cloud such as this will be very likely to give rain unaided; and indeed the claim made for rain-making is usually not that it will make rain where none would otherwise have fallen, but that it will increase the natural rainfall.

This at once makes assessment difficult. What means are there of telling how much of the rain which has fallen on a particular occasion is natural and how much is artificial? The safest method is to compare the rainfall in the seeded area with that of a nearby unseeded area. But here is encountered the great natural variability of rainfall. The differences caused by seeding are certainly considerably fewer than the natural differences between one locality and another.

To disentangle the natural from the artificial variations is a job for statisticians, and it is generally accepted by them that several years of carefully controlled experiment will be needed to establish whether seeding does have any appreciable effect. Unfortunately the essential elements, continuity and control, are lacking from a great part of the results available at present, many of which have been obtained in the course of commercial seeding operations.

Interest in rain-making has meanwhile been growing steadily, and even in Great Britain, where rain is relatively plentiful, the subject has been raised repeatedly in Parliament and the Press. It was this wide public interest, in a subject where the facts are so uncertain, that led to the starting of the present series of trials on Salisbury Plain.

Salisbury Plain Experiments

Since the object is to acquire knowledge of a technique, and not to control the climate, the experiments on Salisbury Plain are being conducted on a small scale. On the approach of a suitable cloud belt five silver iodide generating stations are set up on a line about 23 miles long, lying roughly N.N.E.-S.S.W., that is, at right angles to the prevailing wind. The generators are started an hour or two before the cloud belt comes overhead and continue to operate until about 2 hours after it has passed. An average experiment lasts about 10 hours, consumes about 6lb. of silver iodide, and costs about £100 in materials and overhead costs.

The generators are very simple. Each is made from a brazier's kerosene-burning blowlamp, modified so that a solution of silver iodide in acetone can be fed into the flame at a controlled rate. They are kept and prepared for use at the Chemical Defence Experimental Establishment, Porton, where they were designed and tested. Each generator produces something like 20 million million

silver iodide crystals per second. This is a very large number, but it is not yet known whether it will be sufficient.

The estimations of the results will be based on the rainfall recorded by the network of rain gauges which covers this country, probably the closest network of its kind in the world. For each occasion the location of the seeded area will first be established by studying the winds at all heights up to the level where the silver iodide is expected to have taken effect. The rainfall in the seeded area will then be compared with that in nearby unseeded areas. There will usually be a difference, due partly to the natural variation of rainfall from place to place, and partly to the result of seeding if any. By averaging over about 100 or 150 occasions, it is hoped to eliminate the natural variations and so to be left with the effect of seeding.

These trials will be carried out only when the winds are between south and west, and the silver iodide is unlikely to reach the necessary height before it has travelled about 50 miles. The seeded area will generally lie therefore in the East Midlands, Eastern Counties, or Home Counties. Only broad layer-type clouds will be seeded, mainly, it must be admitted, because this eases the statistical difficulties, but there is a secondary result that no experiments will be conducted in conditions likely to give hail, thunder, or very heavy rain.

The experiments did not begin until after the 1955 harvest, and so far there have been only 3 trials. It is therefore much too early to start assessing results. But it is difficult to see how the work can do any harm to agriculture. The materials are harmless and are released in very small amounts, and the only likely result is a small increase of rainfall at a time when there would have been rain in any case. Moreover, the area affected, being determined mainly by wind direction, will vary from experiment to experiment.

There remains the question as to what would be the consequences if these or any other experiments of a similar kind were to show that rainfall can be controlled on a scale which is economically significant. One can hardly imagine such a power being left in the hands of commercial operators, and one may surmise that sooner or later a government would endeavour to use it for the general good. Some may feel that this is an alarming prospect, but at least there is no danger that any step taken would be irrevocable. If organised rain-making failed to satisfy the public, it would have only to be stopped and the ordinary course of Nature would return.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of April.

NORTH ISLAND

December

*1 December—Kaikohe A., P., and H. at Kaikohe.
1 December—Hauraki A. and P. at Paeroa.
8 December—Helensville A. and P. at Helensville.
12 December—Ohura Ram Fair at Nihoniho.

January

1 January—Nuhaka A. and P. at Nuhaka.
11 and 12 January—Wairoa County A. and P. at Wairoa.
18 and 19 January—Feilding I., A., and P. at Feilding.
*19 January—Kaeo A. and P. at Kaeo.
19 January—Central Hawke's Bay A. and P. at Waipukurau.
22 and 23 January—Rotorua A. and P. at Rotorua.
*25 and 26 January—Horowhenua A. and P. at Levin.
26 January—North Kaipara A. and P. at Paparoa.
30 January—Marton A. and P. at Marton.

February

1 and 2 February—Rodney A. and P. at Warkworth.
2 February—Woodville A. and P. at Woodville.
*2 February—Rangitikei A. and P. at Taihape.
*5 and 6 February—Dannevirke District A. and P. at Dannevirke.
7 February—Te Kauwhata A. and P. at Te Kauwhata.
8 February—Dannevirke District Annual Ram Fair at Dannevirke.
8 and 9 February—Taumarunui and District A. and P. at Taumarunui.
8 and 9 February—Taranaki A. and P. at New Plymouth.
9 February—Pahiatua A. and P. at Pahiatua.
9 February—Hukerenui A. and P. at Hukerenui.
13 February—Te Awamutu A., P., and H. at Te Awamutu.
15 and 16 February—Ohura A., P., H., and I. at Nihoniho.
*15 and 16 February—Masterton A. and P. at Masterton.
16 February—Tauranga A. and P. at Tauranga.
16 February—Northern Wairoa A. and P. at Arapohue.
16 February—Waiapu P. and I. at Ruatoria.
16 and 17 February—Franklin A. and P. at Pukekohe.
19 February—Otorohanga A. and P. at Otorohanga.
21 February—Matamata A. and P. at Matamata.
22 and 23 February—Te Kuiti and District A. and P. at Te Kuiti.
22 and 23 February—Wellington and Hutt Valley A. and P. at Trentham.
23 February—Putaruru District A. and P. at Putaruru.
*23 February—Te Puke A. and P. at Te Puke (50th Jubilee).

March

2 March—Albany A. and P. at Albany.
2 March—Mangonui County A. and P. at Kaitaia.
2 March—Waiotira Junction A. and P. at Waiotira.
2 March—Waikato Central A. and P. at Cambridge.
2 March—Whakatane A. and P. at Whakatane.
6 March—Morrinsville A. and P. at Morrinsville.
*9 March—Opotiki A. and P. at Opotiki.
9 March—Kumeu District A. and P. at Kumeu.
15 March—Wellsford A. and P. at Wellsford.
16 March—Hawke's Bay A. and P. at Hastings.

SOUTH ISLAND

December

1 December—Motueka A. and P. at Motueka.
*4 and 5 December—Gore A. and P. at Gore.
8 December—Otago Peninsula A. and P. at Portobello.
8 December—Wyndham A. and P. at Wyndham.
*11, 12, and 13 December—Southland A. and P. at Invercargill (Centennial).
15 December—Tokomairiro A. and P. at Milton.

January

12 January—Blueskin A. and P. at Waitati.
19 January—Waikouaiti A. and P. at Waikouaiti.
19 January—Peninsula H. and P. at Duvauchelle.
*26 January—Golden Bay A. and P. at Takaka.
26 January—Palmerston and Waihemo A. and P. at Palmerston.
*26 January—Waiau A. and P. at Tuatapere.
30 and 31 January—Otago A. and P. at Dunedin.

February

2 February—Banks Peninsula A. and P. at Little River.
16 February—Murchison A. and P. at Murchison.
*22 and 23 February—Buller A. and P. at Westport.
23 February—Maniototo A. and P. at Ranfurly.
23 February—Kaikoura A. and P. at Kaikoura.

March

2 March—Temuka and Geraldine A. and P. at Winchester.
9 March—Cheviot A. and P. at Cheviot.
9 March—Mt. Benger A. and P. at Roxburgh.
16 March—Upper Clutha A. and P. at Wanaka.
16 March—Hawarden A. and P. at Hawarden.
*16 March—Mayfield A. and P. at Mayfield.
30 March—Methven A. and P. at Methven.

April

6 April—Oxford A. and P. at Oxford.
22 April—Strath Taieri A. and P. at Middlemarch.
*22 April—Mackenzie Highland Show at Fairlie.

* The Department of Agriculture exhibit will be staged at this show.

"Consolidated Index to 'Journal'"

The fourth section in the series of consolidated general indexes to the "Journal" has been printed and is now available for 10s. a copy, post free.

This index, which lists all the material published in volumes 61 to 80 of the "Journal" between July 1940 and June 1950, follows the style of the three preceding indexes. It is of 174 pages and contains about 9000 references.

Copies can be obtained from the Auckland, Palmerston North, Christchurch, and Dunedin offices of the Department of Agriculture or from Publications Section, Department of Agriculture, 22 Customhouse Quay (P.O. Box 2298), Wellington.

Use of Swarm Box in Raising Queen Cells

ONCE a beekeeper has made plans for apiary management envisaging a supply of young queens it is essential that he be able to raise queen cells even if conditions become difficult. In this article I. W. Forster, Apiary Instructor, Department of Agriculture, Oamaru, discusses how the swarm box can be used to make the raising of queen cells more dependable.

Filling the swarm box in the apiary.

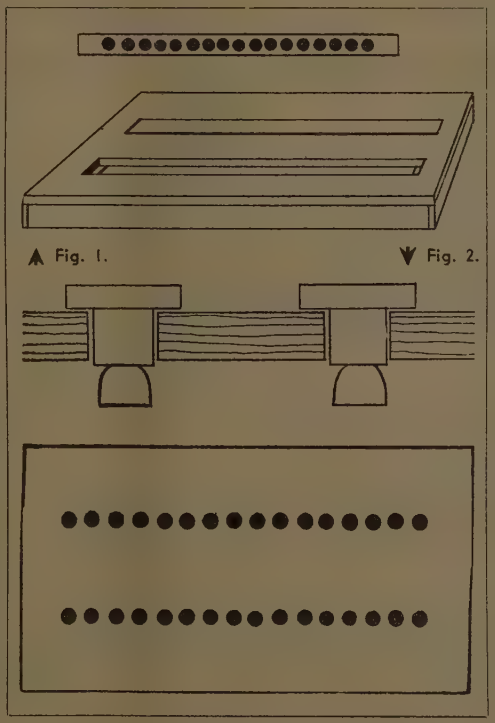
THOUGH many more convenient methods of raising queen cells may well be employed when circumstances are favourable, the swarm box can be used to great advantage when difficult conditions would make cell raising by any other means precarious.

The principle is that about 2lb. of nurse bees from a hive that has been fed for some days are confined to a ventilated box in a warm room. They are supplied with honey, pollen, and water and left for about 5 hours. They are by then fully aware of being hopelessly queenless, they are loaded with brood food, and are generally in a perfect mood to receive a graft of cells. Being shut off in a controlled temperature the bees are entirely removed from the effects of outside conditions and will start cells uninfluenced by bad weather, robbing bees, or any other of the variable factors which can at times make it almost impossible to obtain worthwhile "takes" out in the apiary.

The Box

The most convenient-sized box is one that will hold five full-depth combs. This allows for one comb each of pollen, honey, and water with two spaces left for frames of cells. The bottom of the box should be of wire gauze with a 1in. x 1in. runner at each end to give ventilation. If the ordinary frame type of cell holder is to be used, the lid of the box can be the usual telescope cover over a mat.

It is possible to use a slotted cover as in Fig. 1 to allow the bar of cell cups to be inserted from the outside without the swarm box having to be opened. The bar needs to sit down into the slot so that the top is flush with the top of the lid. A ledge of tin plate at each end keeps the bar from falling right through. Another method of suspending the cells is through two rows of $\frac{3}{4}$in. holes bored in the cover as in Fig. 2. The wooden cell bases used in this method have a flange wide enough to keep them from falling through.



▲ Fig. 1. ▼ Fig. 2.

Though working with cell cups suspended through openings in the lid is very convenient, in practice best results are obtained if the grafts are placed right down into the centre of the cluster. A swarm box can easily start up to 60 cells, which can be accommodated comfortably in two frames each holding two bars. It is difficult to use more than 30 cells in either method of suspending them from the cover, and full use cannot then be made of the swarm box's potential.

Method of Using Box

A comb of fresh pollen is placed in the centre of the swarm box, a comb of honey against one side, and a comb of water against the other as in Fig. 3.

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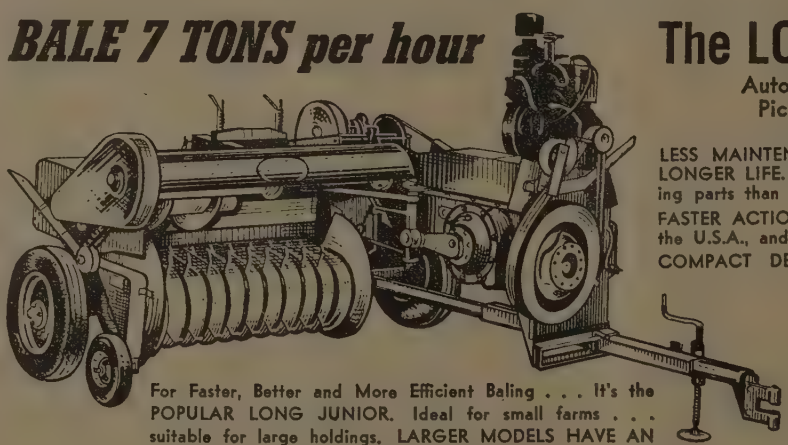

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USE OF SWARM BOX IN RAISING QUEEN CELLS

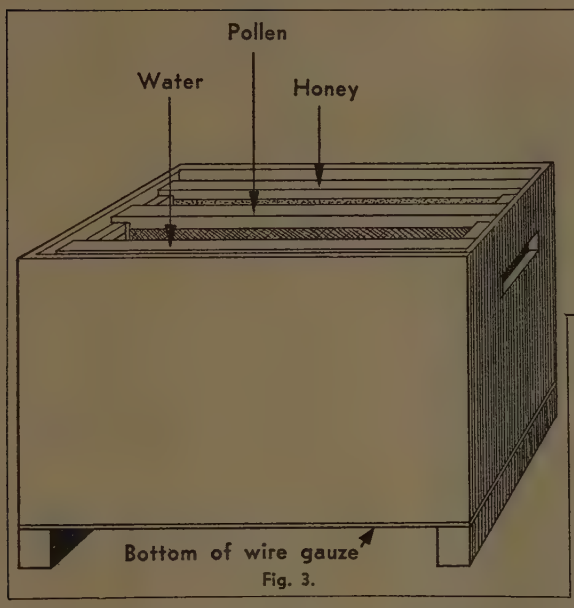

Fig. 3.

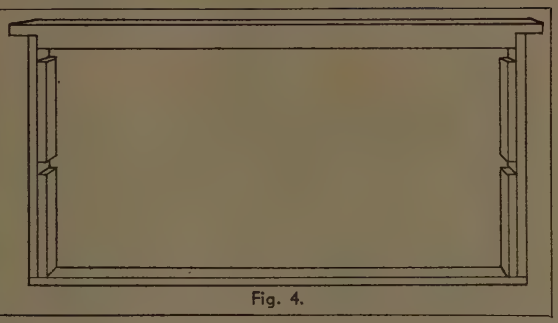
Fig. 4.

A little thin syrup filled into any spare cells in the pollen or honey comb is an advantage in giving further stimulation. As in all queen rearing every hive to be used should be fed with syrup throughout the operation and for some days before.

The swarm box is filled by shaking the bees off four or five brood combs. For preference the brood should be unsealed to ensure that a preponderance of the bees will be of nursing age. The bees need not all come from the same hive, as under these conditions bees from several colonies will mix without fighting. It is, of course, essential to be sure that no queen bee is shaken into the swarm box. A convenient way of obtaining bees for this purpose is to shake several frames of brood clear of bees and place them above a queen excluder. The nurse bees that climb back on to this brood then provide a convenient source of bees ideal for use in the swarm box.

In fact during the time that one is likely to be using this method of queen rearing it is a good idea to maintain some of these queenless reservoirs of nurse bees by always keeping some brood above excluders. This allows a swarm box to be made up with a minimum of trouble and at short notice, which means that queen cells can be started on days when the beekeeper cannot carry on with ordinary apiary work because of inclement weather.

When filled the box is taken indoors and kept at a moderate temperature. In 4 to 5 hours the bees will be ready to receive the grafted cell cups. The cells are grafted in the ordinary way or strips of comb containing young larvae can be cut out and stuck to the cell bars. When comb strips are used only every fourth cell need be left, the grubs and cells in the three in between being destroyed to get correct spacing of the finished cells.

If flanged cell cups are used in holes in the cover, each one is removed in turn to be grafted. The vacant hole is temporarily covered to prevent the escape of bees. When grafts are being put into the swarm box it is best to avoid using smoke.

The cells must be removed from the swarm box in from 24 to 36 hours. The bees can be dumped back in the hive or hives from which they were taken.

The Cell-finishing Colony

Cells started in a swarm box should be finished in a cell-finishing colony. This is prepared by confining the queen of a strong colony to the bottom box by a queen excluder and raising two or three frames of unsealed brood into the second box to draw up the nurse bees. The frame of cells is then placed between this brood in the second story.

Cell-finishing colonies must be fed continuously from 3 to 4 days before the cells are given right up to the time the cells are removed. Thirty cells are usually considered sufficient for one colony, so that when two frames each containing two bars of say 15 cells have been started, it is best to place each frame in a separate cell-finishing colony.

When two bars have been started in slots in the lid of the swarm box these can be slid conveniently into a frame with suitable brackets attached inside the end bars as in Fig. 4. These brackets can be made of wooden blocks or of stout galvanised iron. If flanged cell cups have been used through holes in the lid of the swarm box, they can be attached to a cell bar by coating it with hot wax and quickly pressing it down on to the bases of the row of cell cups. Each cup should be eased out a little first to break any seal that the bees may have made. Small spikes that stick up from the bottom of the cell cups are also quite effective for this purpose.

Sometimes cell bars with rows of ⅜in. holes are fixed into a frame and the flanged cell cups inserted in the holes as they were in the lid of the swarm box. This method is not satisfactory, as cells built out fat will be prone to injury when withdrawn through the holes.

The finished cells should be removed from the finishing colony 10 days after they were given to the swarm box.

Main Points

The main points about the use of the swarm box in raising queen cells are:—

1. Though the swarm box can be used at any time, its greatest value is in having queen cells built when conditions are difficult.

2. Adhering bees from about four well-covered brood frames are sufficient to stock the swarm box. Be sure to have about that quantity, but on the other hand, do not overfill the box.

3. A swarm box will start only one batch of cells and must be restocked with fresh bees before more cells are given.

4. See that the cell-finishing colonies are strong in nurse bees.

5. "Feed copiously every hive that is used in any way during the operation" is an axiom which applies to this as to other methods of queen rearing.

Information about the preparation of cell cups and methods of grafting may be obtained from any Apiary Instructor of the Department of Agriculture.

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Garden Shelter from a Glass Fence

SHELTER plays an important part in the home garden and could take an even more important place than it often does, particularly in some of the more exposed parts of New Zealand. In this article W. E. Ward, Horticultural Inspector, Department of Agriculture, Nelson, describes a glass fence built for garden shelter at Greymouth.

SHELTER is used in the garden to produce a more favourable climate, enabling a greater variety of plants to grow than would otherwise be possible. There are many places in New Zealand where more shelter could be used to assist gardening and to give homes protection from cold, dry, or salt winds.

Many gardeners have planted shrubs, trees, and plants of various kinds only to find that they have not survived the first year or so. Many of these plantings probably died because of inadequate shelter. Given protection during the early years of life plants become established and will continue to thrive even when the shelter is removed.

A novel type of permanent shelter in the form of a glass fence has been erected by Mr. E. Bunt, of Joyce Crescent, Greymouth. Mr. Bunt's property overlooks the town and sea coast from a moderately elevated situation against the hills, with the garden falling away toward the sea, so that both cold and salt winds sweep across it. These winds, before the shelter was built, made growing conditions difficult and working in the garden was far less pleasant than it is today.

The lower boundary fence. The glass pieces are from waste off-cuts and, though the same length, vary in width.

Portion of the top glass fence, with the other fence running parallel on the lower side of the property.

The glass fence illustrated is built with a few well-spaced, solid posts approximately 6in. x 4in. about 6ft. to 8ft. out of the ground. These posts support three horizontal 4in. x 2in. lengths of timber which support 2in. x 2in. uprights rebated to take the glass. Glass pieces are all cut the same length, but as they are made from waste off-cuts, the width varies considerably.

The glass is slid down in the slot made by the rebate and each piece rests edge to edge on top of the one underneath. No lap is necessary, as the fence does not have to be waterproof as do the roof and sides of a glasshouse.

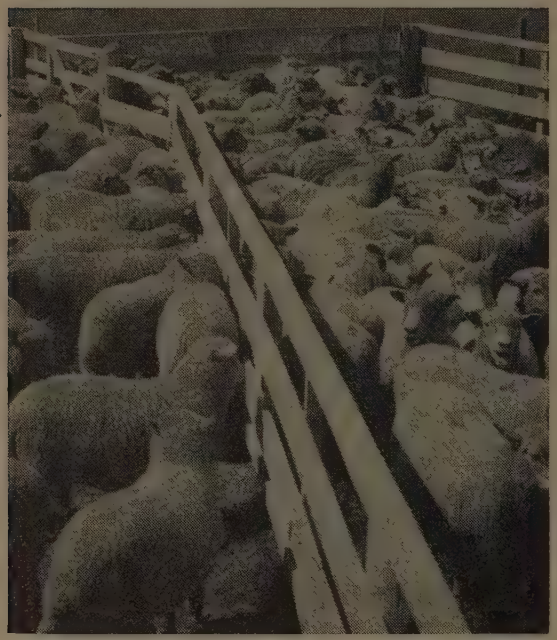
Mr. Bunt has constructed two of these fences to suit his property. As the garden slopes fairly steeply down in the direction of the prevailing wind, the first fence was constructed along the lower side of the property and the second one some 80ft. higher up but parallel to the first.

The land lying between the two fences enjoys an almost tropical climate, and the rest of the property behind the top fence (which includes the house and flower garden, etc.) is given warmth and shelter that would be acceptable in many homes throughout the country.

These glass fences, with all the woodwork painted green, make a pleasing and useful background for the plants and fruit trees growing within their shelter.

Care of Livestock during December

Contributed by the Animal Research Division



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AS each lot of lambs is sold their mothers should be drafted off together with any dry ewes which may remain in the flock. If feed is short and the ewes have very little milk, it usually pays to wean all the lambs, which can then be given the best grazing available. The ewes should be shorn and those which are to be retained should be placed on short pasture with ample water until flushing is started 3 weeks before tupping. This will help to reduce their condition and will result in a better lamb percentage in the following season.

CARE OF EWES AND FAT LAMBS

If ewes with lambs are to be shorn, every effort must be made to reduce the time during which lambs are away from the ewes, as it is easy to dry ewes off at this time of the year. They should be brought to the shed in small mobs and should be dagged before reaching the board.

SHEARING

Farmers who wish to eradicate foot-rot from their flocks should obtain the Department of Agriculture Bulletin No. 325, "Foot-rot in Sheep can be Eradicated". This is the season in which the eradication campaign must be planned.

FOOT-ROT CAN BE ERADICATED

The year's production can be materially affected by feed conditions during summer. Cows fed poorly now not only produce less milk during summer, but will dry off earlier in autumn. Dairy statistics show that long lactation is very important, so the feeding of silage or other supplementary milk-producing fodders should be started as soon as pasture begins to dry off. It should never be left until milk production begins to show a material fall.

DAIRY COW NUTRITION

Farrowed sows should receive a daily ration of 4 gallons of skimmed milk plus 2/3 gallon for each pig suckled. Newly weaned pigs should not be overfed; 1½ to 2 gallons per day in three feeds is adequate for the first 14 days. The ration can then be slowly raised to 2½ gallons at the end of the first month, and after the first fortnight the number of feeds can be reduced to two per day.

PIG PRODUCTION

Replacement breeding stock should be selected from the bacon pens, and only the fastest-growing sows with good strong feet and at least 12 well-placed teats should be chosen.

If cows are returning to service, the mating records should be examined to see if any particular bull is to blame. If this is so, it is wise to have a veterinarian or Livestock Instructor collect a semen sample for examination. Care is necessary when replacement bulls are purchased. If possible, a young bull that has not been used previously should be bought. A bull should never be bought in the sale-yard unless his full history is known.

COWS RETURNING TO THE BULL

Washing out cows seldom helps and may cause trouble if irritant fluids, such as kerosene, are used. It pays to consult a veterinarian as soon as the cows are noticed returning to service in unusual numbers. He cannot be expected to diagnose the trouble months later.

So-called roup is often fowl pox. Outbreaks of this disease can be prevented by vaccination, full details of which may be obtained from the nearest Poultry Instructor.

FOWL POX

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during September and for the 2 months ended 30 September 1956, with comparative figures for the same month and 2 months of 1955, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
September 1956	14,799	246	15,045	—
September 1955	16,765	299	17,064	—
Increase or decrease ..	—1,966	—53	—2,019	—11.832
2 months ended 30/9/56	25,348	359	25,707	—
2 months ended 30/9/55	26,678	402	27,080	—
Increase or decrease ..	—1,330	—43	—1,373	—5.070

Butter in store at 30 September 1956 was 9,815 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
September 1956	5,907	416	6,323	—
September 1955	6,639	539	7,178	—
Increase or decrease ..	—732	—123	—855	—11.911
2 months ended 30/9/56	7,653	416	8,069	—
2 months ended 30/9/55	8,014	539	8,553	—
Increase or decrease ..	—361	—123	—484	—5.659

Cheese in store at 30 September 1956 was 9,806 tons

If these figures are converted into butterfat equivalent, there is a decrease of 5.148 per cent. in butterfat graded for the 2 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Pasture Management

Seasonal Notes by the Extension Division

PASTURE management in December should aim at carrying over growth into January and this is assisted by the avoidance of late haying and by early weaning of lambs.

AVOID LATE HAYING

THE feeding value of hay is directly proportional to the amount of grass and clover leaf it contains, so that every effort should be made to conserve hay with the minimum loss of its most valuable constituents. The leaving of a paddock until most of the grasses have fully seeded so that extra bulk can be obtained is not recommended, as the extra bulk gained does not compensate for the lowered feeding value. It is not advisable for a farmer to make up his mind to save a paddock for hay regardless of what happens. If the weather at the time the crop is ready for cutting is unsettled and showery, it is wiser to put the crop into silage rather than delay cutting until weather conditions improve, or cutting and hoping that the weather will improve and allow hay to be made. A pit of average-quality silage on hand is better than a paddock of hay that has been spoilt by rain.

The most important factor in the curing of the crop after cutting is the wind, and every effort should be made to get the crop out of the swath as soon as possible. As the crop dries out care should be taken, if possible, to avoid working the crop during hot sunshine, when the clover leaves in particular are brittle and easily lost during turning and raking.

—A. V. ALLO

* * *

WEAN LAMBS EARLY

IN spring pastures grow quickly until a peak is reached in October-November This growth is usually more than sufficient to supply the full needs of sheep and cattle. After this period growth often slackens, even though the feed requirements of the stock increase daily. One way in which total feed consumption can be reduced is by weaning the lambs and confining their mothers to smaller areas. In the last few years weaning has been practised earlier than usual on many fat lamb and hill country properties and the results suggest that this practice provides a much better balance between feed supplies and stock needs.

Recent research at the Department of Agriculture's Ruakura Animal Research Station has shown that ewes can be more of a hindrance than a help to their lambs when feed is in short supply at this time of year. Four months after lambing many ewes produce little more than 1lb. of milk each day, even though their consumption of feed remains at a high level. At such times weaned lambs on their own do as well as others left with their mothers, because a much greater total amount of pasture is made available to them in compensation for the loss of small quantities of milk. If, on the other hand, feed is ample in early summer, ewes assist their lambs by keeping growth at a short, nutritious stage as well as by providing a little milk. Consequently weaning should take place when stock start catching up on feed supplies. This commonly occurs about 3½ months after lambing on hill country and at the time of picking the first draft of fat lambs on lowland country. On fattening farms the lambs left after the first draft are mainly twins and ones from poor milking ewes, so there is little point in keeping them with their mothers any longer.

Early weaning has a number of advantages. It enables a greater total quantity of food to be grown because once the ewes are removed to a small area many paddocks are allowed to enter the summer with the cover of growth so necessary for reducing the effects of hot, dry conditions. It ensures that more of the feed available is used by profit-earning lambs and cattle and that the relatively wasteful consumption of food by the ewe flock is reduced to a minimum. It enables some food to be set aside for flushing later in the season and allows fat cull ewes to be removed from the farm before the main fat lamb killing season begins. It also eases difficulties in handling the flock at shearing time. Once weaning has taken place the ewes should be stocked quite heavily and be made to clean up rough and weedy areas. Such treatment may not be conducive to maximum wool growth, but any losses which may be incurred will be far outweighed by the extra weight gains of lambs and cattle and better lambing percentages from the ewe flock owing to the availability of flushing feed.

—J. D. J. SCOTT

* * *

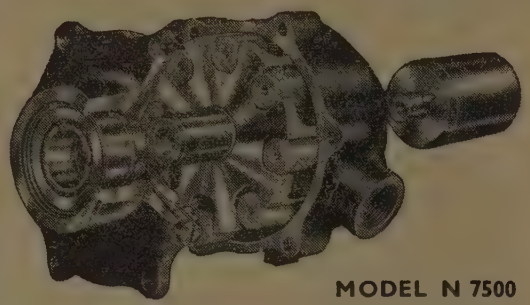
HARVESTING RYEGRASS SEED

THE main problems in harvesting ryegrass seed are when and how to cut and when and how to thresh. For maximum yield and germination the seed should be fully formed but cut before undue seed is lost by shedding. The stage can best be judged by the colour of the straw. The green colour should have practically gone and the seed should separate freely from the straw when they are squeezed lightly in the hand. Few crops are now tied and stooked because of the extra labour required, though for Italian and short-rotation ryegrass this method generally is safer than windrowing.

Heavy crops are cut by a mower with an inside divider, and lighter crops generally are windrowed with a binder with the tying mechanism removed. The aim is to get a windrow with sufficient density to retain seed knocked out by rain showers or by the pick-up of the header. At the same time it should not be too bulky to be handled by the header. The time required between cutting and threshing will depend on weather conditions, but it should seldom be less than a week for perennial ryegrass and 2 weeks for Italian ryegrass and short-rotation ryegrass. The extra time is required for these latter crops because of their tendency to heat in the bags. Every year farmers are put to considerable trouble and lines of seed are severely damaged through threshing being done too soon. Heavy rain on the swath may make it essential for it to be turned to facilitate drying. This will result in seed being lost, but the gentle action of the finger wheel rake will minimise this loss.

For threshing, the header should be in good order. The drum speed should be kept low and the concave given the maximum clearance consistent with clean threshing. Much seed can be lost at the pick-up. A canvas pick-up is generally best, but whatever type is used the swath should be picked up evenly and fed as a continuous band.

—C. P. WHATMAN



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Two New Weedicides Control Grass Weeds in Lucerne

By M. S. FOREMAN,
Fields Instructor, Department of Agriculture, Invermay Research Station

THE deterioration of lucerne stands caused by the invasion of grass weeds has long been a problem. For many years cultivation has been the accepted method of control, but the results achieved have rarely justified the popularity of this technique. Lucerne is a high-crowned plant and cultivation must always cause some damage to the plant. Too often the result of a thorough cultivation is merely a reduction in the vigour and density of the crop and the provision of an ideal seed-bed for future generations of weed seedlings. In recent years, however, advances in chemical weed control have placed a promising alternative within the reach of farmers. In particular, two weedicides, TCA and dalapon, have proved capable of achieving good control of a wide range of grass weeds.

BOTH TCA and dalapon are comparatively new materials, and their use both experimentally and commercially has been somewhat limited. Sufficient is known about them, however, to indicate that these chemicals will behave differently under differing conditions of soil and climate. For this reason specific recommendations are not possible, but an appreciation of the basic principles should enable farmers to use the materials effectively.

Though similar in the results they achieve, TCA and dalapon are dissimilar in their action. The main difference lies in their mode of entry into the plant. TCA is absorbed through the roots with the plant foods, whereas dalapon is taken into the plant through the leaves. It is important to recognise this fundamental difference, for on some occasions this will dictate the material to be used.

Both materials are sold commercially as water-soluble powders and are comparatively easy to apply. Constant agitation of the spray mix is essential to prevent the settling out of the chemical; otherwise spraying is very straightforward.

TCA and dalapon are slightly caustic and precautions should be taken to prevent injury to operators. The caustic nature of the chemicals will often cause contact scorch, but this can be minimised by using high rates of water. A minimum rate of 30 gallons per acre should be used.

Damage to Lucerne

Damage to the lucerne crop as a result of applying these chemicals is unlikely to be severe provided excessive rates are avoided. Damage will vary from place to place and from season to season, but experience in trial work indicates that even under the most unfavourable conditions reduction in yield is unlikely to be very great or very lasting if the recommended rates are used.

Complete defoliation of the crop before spraying assists in reducing crop damage and both mowing and grazing are effective methods of achieving this. Some lucerne plants have shown symptoms of a systemic disorder after treatment with dalapon, but the evidence is not consistent. However, in no case has this been very severe and recovery has always been complete.

HEADING PHOTOGRAPH: A good crop of lucerne. As grass weeds can now be controlled in such crops, it is hoped that much more lucerne will be sown.

When is Spraying Justified?

When the feasibility of reclaiming a grass-infested stand is being considered one important factor must be remembered. Lucerne is not capable of regeneration in the same manner as plants such as white clover or ryegrass. Future production can come only from surviving crowns and no increase in plant population is possible from reseeding or tillering.

On the other hand it is possible to be deceived into condemning a stand by relying on casual observation over the last one or two cuts. Lucerne will not yield prolifically when growing in competition with a dense population of grass weeds. An apparent lack of lucerne at cutting time can easily be attributed to a decline in plant density when, in fact, this is not the case. A decision as to whether or not spraying is justified can be made only after a careful examination of the area. The costs of lucerne establishment are too high to allow the summary condemnation of a potentially productive stand.

Choice of Weedicide

The decision on which of the two chemicals to use will be influenced by a number of factors, the most important being the type of grass weed present and the time of year when spraying is contemplated. Of these, the type of grass should, where possible, dictate the material, and the time of spraying should be adjusted accordingly.

Annual Grass Weeds

Grass weeds fall into two main categories, annuals and perennials. Where annual grass weeds are the problem TCA is probably the best material to apply. TCA has the

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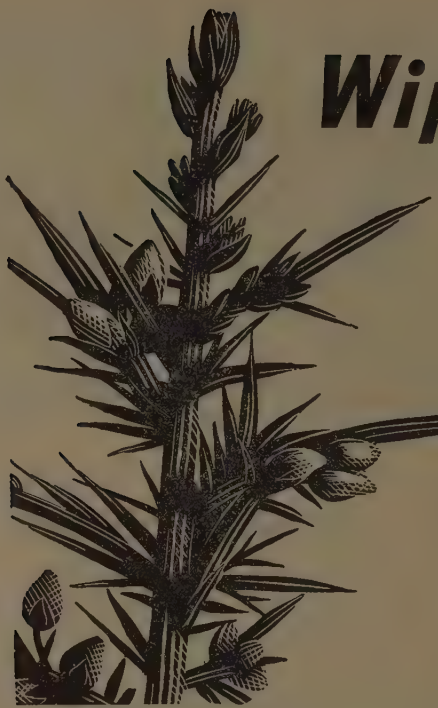

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ability of retaining some of its weedicidal property in the soil, which enables it to exert a measure of control over successive generations of seedlings. Where free-seeding grasses such as *Poa annua* are a problem this characteristic of TCA is an obvious benefit.

The period for which this residual toxicity is sufficient to exert effective weed control will vary considerably. As a general rule breakdown of the chemical occurs most rapidly in soils high in organic matter and when soil temperatures are high. Leaching also causes a rapid loss of residual toxicity.

Optimum conditions at the time of application are essential if TCA is to be used successfully. In most districts these requirements are most likely to be met in late autumn. To be fully effective TCA demands sufficient moisture in the soil to carry it down to the plant roots and cool soil conditions to prevent too rapid breakdown of the chemical. Also, it is essential that the grasses be making some growth at the time of spraying, for dormant plants are incapable of absorbing the weedkiller.

Late autumn application is favoured also because at that time the crop is entering the dormant season and any damage that may result from spraying is of little consequence. Recovery can take place during the non-productive, winter months. Spring applications have been successful in grass weed control, but the attendant reduction in crop yield during the early part of the season precludes the adoption of this technique in most cases.

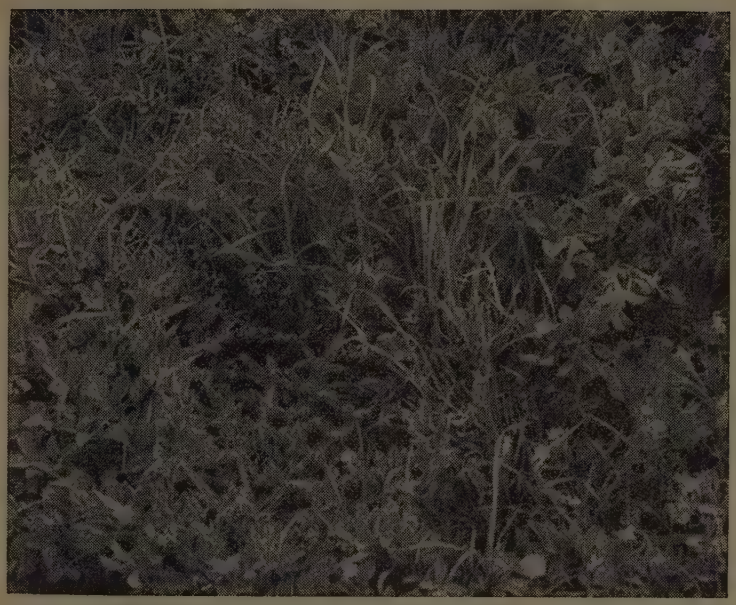
The amount of TCA necessary to effect good control will depend largely on the density and nature of the weed population. In most instances 15lb. to 20lb. per acre should prove sufficient and rates in excess of this are rarely justified. Crop damage becomes progressively more severe as rates are increased. At 15lb. per acre the cost of the material is about £2 5s., little enough when the continued productivity of a lucerne stand is at stake.

Perennial Grass Weeds

Where perennial grasses comprise the bulk of the weeds present dalapon is recommended in preference to TCA. Dalapon is an easier chemical to use, as it is less demanding in its requirements. Provided the grasses are making vigorous young growth, dalapon can be applied at any time irrespective of soil moisture conditions. Rain-free weather for a few days after spraying is necessary to permit the maximum absorption of the chemical.

Dalapon is not effective when applied to mature, stalky grass or grass that is dormant.

Probably the best time to apply dalapon is immediately after the first cut in spring, when the grass weeds are making vigorous growth and reasonably settled weather can be expected. At this time of the year lucerne grows extremely rapidly and several inches of growth often appear between the time of cutting and the removal of the hay from the paddock. It is advisable to remove this before spraying either by grazing or mowing, as the extent of subsequent crop damage appears to be in direct proportion to the amount of leafage displayed by the lucerne at spraying.



Deterioration of a lucerne stand caused by the invasion of perennial grass weeds. This condition can be avoided by the application of dalapon, which is better for the control of perennial weeds than TCA.

Dalapon is a more potent weedicide than TCA and the rate can accordingly be reduced. For heavily infested stands 8lb. of dalapon per acre is sufficient to effect good control of most weed grasses. For moderate infestations of reasonably susceptible weeds as little as 5lb. per acre can be applied. It is advisable to add a little detergent to the mix, for this aids distribution and adhesion of the chemical to the leaves.

Dalapon to date is more expensive than TCA and the cost of the material for an application of 8lb. per acre is about £5 10s. Here again, the cost is not out of proportion to the value of a productive lucerne stand.

Annual and Perennial Grasses in Same Sward

Both annual and perennial grasses will often be present in the sward and the best control then can be achieved often by using both materials together. The two weedicides are quite compatible and can be used successfully in this way.

When a mixture is being used consideration must be given to the differing requirements of both chemicals and a compromise must be made if both are to be effective. Excellent results have been obtained when the mixture was applied in early spring, just before the lucerne broke dormancy. Grasses generally begin their spring growth earlier than does lucerne and local experience will indicate the correct time to spray. High doses of TCA at this time are liable to reduce lucerne production and it is advisable to restrict the rate to no more than 10lb. per acre. A mixture of 4lb. to 5lb. of dalapon and 5lb. to 10lb. of TCA per acre is recommended, the actual amounts being dependent on the density and composition of the grass population.

The development of these two chemicals represents a remarkable advance in chemical weed control. As with most of the recently introduced weedicides, certain rigid conditions must be obeyed if results are to measure up to expectations. Fortunately, these requirements can be met in full with the minimum of inconvenience, and the efficient use of both dalapon and TCA is well within the scope of every farmer.

It is to be hoped that the knowledge that grass weeds can be controlled will encourage the sowing of a great deal more lucerne.

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RED CLOVER FOR SEED	Californian Thistle	Legumex 'M'	3	15	Spray before clover flower buds appear.
	Docks	Legumex 'M'	4	15	
GRASS SEED	Thistles	Phoxylene	2½	5 - 15	Spray when shutting up.
WHEAT BARLEY OATS RYE CORN	Annual Weeds e.g., Fathen	Phoxylene	2	5 - 15	Do not spray before 4 leaf stage, nor after the shoots become swollen with the developing ear.
	e.g., Cornbind	Phordene	1¾	5 - 15	
	Cal. Thistle Tares	Phoxylene	2½	5 - 15	Delay spraying until weeds in full leaf.
PEAS	Annual Weeds	Sevtox or	3 - 4	30	Spray weeds as young as possible.
		Legumex 'M'	3	15	
	Cal. Thistle	Legumex 'M'	3	15	Spray when thistles 3in. to 6in. high.

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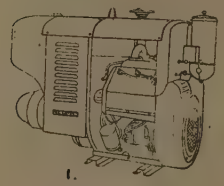
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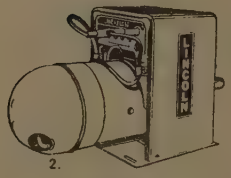
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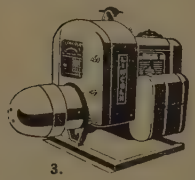
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Trees on the Farm

The Second Crop

BEFORE the first crop of trees is harvested the future use of the land must be decided. Some stands will revert to pastoral use in spite of the obstacles caused by the presence of stumps; but if the woodlot has been well sited in the first place, it is likely that continuing crops of trees are the best use for the land. This article by W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service, draws attention to matters needing consideration before the final felling.

THE second crop can be obtained by replanting (artificial regeneration), or from seed falling naturally from the original or from a nearby stand (natural regeneration).

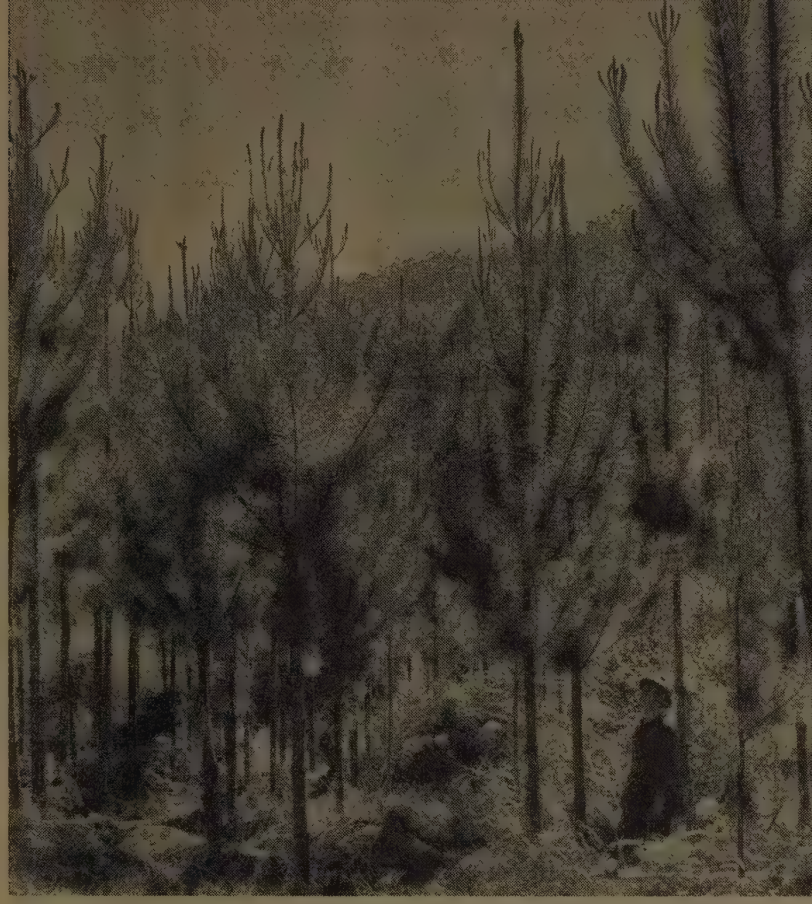
Artificial Regeneration

Artificial regeneration becomes necessary when the owner wishes to change the species or when the original is one which does not readily regenerate naturally on that kind of site. This method of restocking requires, of course, the same operations as in the original establishment; stock and rabbit proofing of the area, the purchase or the raising of sufficient plants, and the planting of them. If the first crop was one of the pines, it is advisable to wait 3 years before replanting to avoid damage by the bark beetle (*Hylastes ater*), which breeds in the stumps and attacks seedlings.

Natural Regeneration

Where no species change is planned and provided the one forming the first crop will regenerate freely on the particular site, restocking by natural means is infinitely preferable. Besides saving the cost of plants and the expense of planting, self-sown seedlings get a much better start in life and do not suffer the checks after transplanting.

An objection sometimes raised against natural regeneration is that it is too irregular—too dense in places and too sparse in others. The former condition needs an early thinning and the latter one may require reinforcement by planting up blanks. However, the expense of any such thinning or blanking-up is small compared with the cost of complete restocking.



Natural regeneration of radiata pine. The stand was previously very dense, but is now low pruned and lightly thinned. It is 11 years old.

Though natural regeneration sometimes comes easily and is very prolific, thinning is often necessary to let in more light or the litter has to be scarified to expose the soil. This job is often sufficiently well done during extraction of felled parent trees. Some few species, especially in the cooler districts (for example, radiata and muricata pines in much of the South Island), do not release their seed while the cones remain on standing trees, but do so in the more intense heat of the ground in summer. Felling is then often necessary before regeneration can be obtained in sufficient quantity.

The seeds of most cone-bearing trees are winged and they travel varying distances from their parents, the spread being greatest on the side away from the prevailing wind. Consequently, fellings to be followed by regeneration should proceed from the lee side toward the windward side of a plantation and the strip should be no wider than the distance the seed is able to travel easily.

Some tree species do not produce seed in considerable quantity every year; in fact their good seeding years may be separated by intervals of up to 5 or even 7 years. Only a small quantity will be produced in the intervening years and this must be remembered when felling is being planned with regeneration in mind.

Current Work

SEED sown in October should be germinating this month, especially if it has been protected by frames covered with scrim, slats, or leafy branches. Weeding should be begun early and at no stage should weeds be allowed to become so big that their removal may result in the seedling trees being pulled up with them.

Young trees planted earlier in the year should be examined to see if it is necessary to cut back adjacent grass or weed growth that might be endangering them.

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Control of External Parasites of Poultry is Essential

ONE of the factors contributing to success in poultry keeping is constant vigilance against infestations of external parasites. Many household poultry keepers are completely unaware of the ubiquitous nature of some of these pests and make little or no effort to eradicate them. No poultry house or flock is immune to attack and if preventive measures are not an important part of management, the efficiency of any poultry unit is impaired. This article by C. J. Goldsmith, Poultry Instructor, Department of Agriculture, Christchurch, discusses various external parasites of poultry and describes their control.

PARASITISM in poultry causes indifferent laying, loss of vigour, stunted or retarded growth, nervousness, and lowered resistance to disease. Household poultry keepers who are disappointed with the performance of their birds are frequently prone to seek an explanation outside their flocks and assume that their unsatisfactory results are caused by poor breeding stock, unreliable food, unseasonable weather, or inherent disease, but often bad management by the owner is the reason.

Red Mite

A number of mites are known to infest poultry, but the common red mite is the most prevalent in New Zealand poultry units. It may well be the most insidious and destructive element in backyard poultry keeping. This mite is easily discernible when it is disturbed and if it is placed on the hand or a sheet of white paper, it can be observed to crawl comparatively quickly. It is grey, but, being a blood-sucking parasite, usually appears deep red when found in a house containing poultry, the red tinge depending on the amount of blood it has recently taken from a bird. If a colony of mites are crushed, there are indications of blood. This mite remains dormant during the day, emerging at night to attack the host bird.

Blood is essential for the development of the mite, but it may live several months without food, especially during winter.

The eggs of red mite hatch within a few days in warm weather and colonies will increase rapidly during spring and summer. The pest may be spread by wild birds which use fowl feathers for nesting, and as a number of mites may remain on the host during the day, it can also be spread from one part of the poultry unit to another by transfer of birds.

These mites will inevitably appear in a new poultry house on a virgin site even when it is erected many miles from other poultry.

Red mite is usually found during the day in dark hiding places such as cracks, the under sides of wooden perches, crevices in wooden walls, between two pieces of wood nailed together, in or under wooden nest boxes, or even under heavy accumulations of dry droppings. It may also be found under wires in laying cages or in branches of trees used for perching outside.

The site of infestation is usually near the perching place, as red mites prefer easy access to their source of food and in normal conditions take about 1 hour to crawl to the host, feed, and then return.

The common practice of nailing undressed wooden perches hard down on wooden supports, thus leaving potential hiding places undisturbed for perhaps years at the most convenient position for the parasite, is probably the most frequent cause of infestation.

As red mites need darkness and hiding places, it is advisable to remove all superfluous boxes and wooden projections near perches. Perches should never overlap and should be so constructed that the under sides may be examined with minimum trouble. They should be free of cracks and, if possible, suspended from the roof by wires or placed on iron or pipe fittings.

Control

During the annual clean-up perches, woodwork, and the floor should be painted or sprayed with creosote, a mixture of waste engine oil and kerosene, or any of the commercial preparations now on the market.

The addition of kerosene to the waste engine oil gives greater penetration and facilitates spraying. The amount of kerosene to use depends on the consistency of the oil.

Commercial preparations often contain DDT or benzene hexachloride (BHC), which has a residual effect for some weeks.

A careful search should be made at intervals and new or clean pens inspected soon after birds have been housed or transferred from other quarters, especially range houses.

If a mild infestation is discovered under the perches, a further search should be made of likely hiding places. The presence of red mite is indicated by a white, greyish powder deposit near the colony. If a heavy incidence is then discovered, it is advisable to rid the house of these pests by transferring the fowls to other quarters if possible. Remove the litter and paint or spray the entire pen. Inaccessible colonies may have to be reached by use of a pinch bar or similar tool.

[After U.S. Department of Agriculture bulletin, reproduced in "Diseases of Poultry", Collegiate Press, Iowa, U.S.A.

A female red mite, greatly engorged with blood after feeding.

However, if there are isolated clusters, it is preferable to eradicate the mite by direct contact. This may be done by use of an old brush and a tin of creosote or any of the other preparations recommended above; care should be taken that whatever is used reaches and soaks into all cracks and holes and that no mites are overlooked. A sack or suitable piece of material soaked in the preparation should be placed directly under the cluster of mites being eliminated, as a number of them may be merely dislodged and fall unharmed into the litter.

Spraying is more effective when dust, dirt, and litter have been removed.

The treatment advocated for the elimination of body lice, which entails the application of nicotine sulphate to the perch before the birds roost, may not eradicate red mite.

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not taken preventive measures and who are not familiar with red mite should assume that it is present in their poultry houses and take action to control it.

Scaly Leg Mite

The condition known as scaly leg is present frequently in household poultry units. It is often noticed where birds are kept in a bare, fowl-sick run and have mud-encrusted shanks during wet weather or in a pen with a muddy earth floor, insufficient litter, or general unhygienic conditions. The parasite often attacks old heavy-breed hens used for brooding chickens and certain breeds of bantams.

The condition is caused by a small itch mite which burrows under the scales of the shank. The mites spend their entire life cycle on the bird. Eggs are laid in channels where they hatch out into young mites, which begin making fresh burrows.

The activities of these mites cause a severe irritation and birds affected may eventually become lame.

The condition may easily be recognised by encrustations of grey, dry, crumbly matter and loosened scales on the shank and between the toes. There is also a dry, musty, characteristic odour and the leg is hot.

The loosened, lifted scales are caused by the accumulation of dry debris resulting from the activities of the mite.

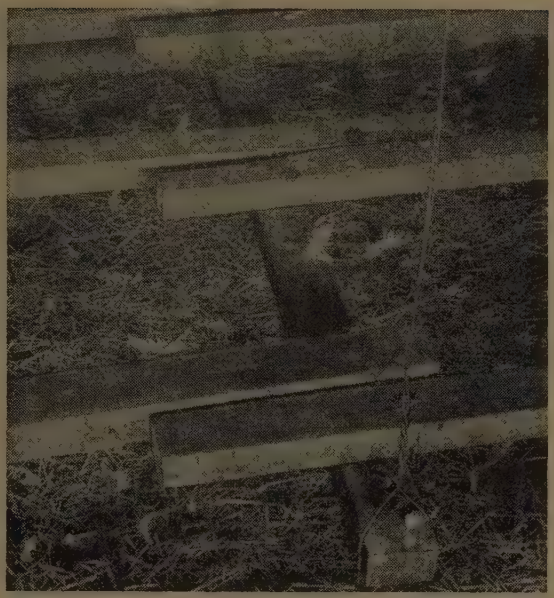
Transmission to other birds is slow and is made by contact and affected surroundings.

Control

Where unfavourable conditions exist in the poultry run hens should be confined to the house in wet weather.

[*Fraser Niederer*

Method of dipping a bird's legs for treatment of scaly leg. Inset—Legs of bird infested with scaly leg.



[*Fraser Niederer*

These perches are held up by wire and are allowed to rest on a cross-bearer. As the perches are not fixed, they can be lifted up easily to expose the space between perch and bearer. Though this is a rough method of arranging perches, it enables mites to be detected easily in the places where they are likely to congregate.

Wet conditions should be eliminated from the house and earth floors well covered with litter.

Treatment is as follows:—

Dip and soak the affected foot or shank in a large jam or fruit tin or bucket containing warm, soapy water. Remove crusts, dirt, and old scales by brushing them with a hand brush or old toothbrush. Then dip the foot into another tin containing a mixture of either fuel oil and kerosene in equal parts or 1 part of kerosene and 2 parts of linseed oil. Alternatively after the foot has been soaked it can be rubbed in a solution of 1 part of kerosene to 5 parts of lard or 1 part of creosote to 20 parts of lard.

Repeat the treatment at weekly intervals if necessary.

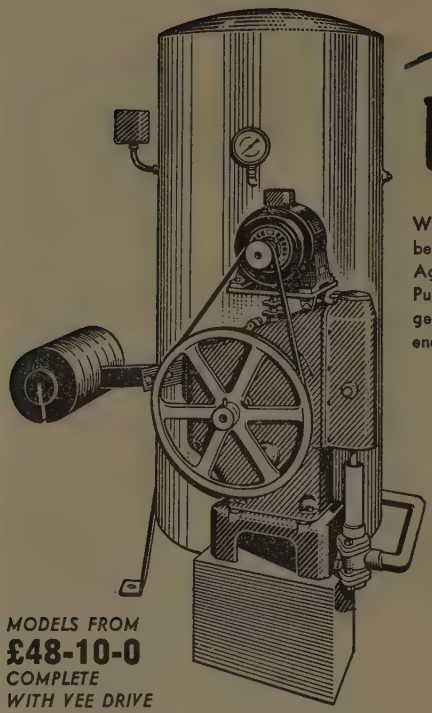
When kerosene preparations are used care should be taken that the mixture does not touch the bird's skin above the shank, as severe burning and irritation will result.

Depluming Mite

The depluming mite, an extremely small itch mite, is fortunately rare in New Zealand. These mites are smaller than scaly leg mites and live at the bases of feathers. They cause intense irritation, and affected birds will pluck out their own feathers.

Birds lose weight and their egg production drops. The presence of the mite is indicated by scales, lumps, and crusts at the bases of the feathers, but feather picking should not be taken as an indication of the pest. Poultry keepers are advised to communicate with the local Poultry Instructor if an outbreak is suspected, as the mite is difficult to eradicate.

Affected birds should be isolated and the house treated as for red mite.



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Individual birds are usually treated with an ointment made from 1 part of flowers of sulphur and 4 parts of petroleum jelly or 1 part of caraway oil and 5 parts of petroleum jelly.

Lice

The lice which affect poultry belong to a very large order known as chewing or bird lice. The main groups in New Zealand appear to be body lice, head lice, and wing lice. The common large body louse is the most prevalent.

Lice are small, flattened insects which are able to move rapidly and are grey or yellowish brown. Body lice move over the skin and body and feed on particles of feather and scales of the skin. Many authorities now consider they draw and consume blood by gnawing through the covering layers of skin.

Lice have sharp claws and cutting and biting abilities which enable them to feed. They cause considerable irritation and birds become unthrifty and nervous. A heavy infestation prevents sound sleep and birds may lose weight.

Lice are permanent parasites and spend their entire life cycle on the host.

Eggs or nits of the body louse are found at the bases of feathers near the vent and are easily distinguished as large, hard, silvery white clusters of varying size. If they are plucked off a bird and examined in sunlight, they appear as clusters of circular eggs which glisten.

Eggs hatch out within 5 to 8 days and the young lice reach maturity in about 2 to 3 weeks.

As the life span is several months, even one pair of lice left undisturbed may produce many hundreds of descendants during that period.

The heat of a fowl's body is necessary for hatching the nits, and the lice themselves die within a few hours of leaving the host. They will not live on a human body. Lice develop at any time of the year, though some investigators overseas claim that multiplication is greater during winter. In New Zealand lice appear to be most pronounced during the warm months after Christmas.

Male birds when reaching maturity are often affected, perhaps because of a reluctance to dust bath. Healthy, active females able to dust bath regularly can apparently keep these vermin in check with the assistance of occasional preventive measures. Broody hens and sick birds usually show the greatest infestation; sick birds should always be eliminated as soon as possible.

Control

Birds of various ages, particularly breeding males and broody hens, should be examined at regular intervals. Particular care should be taken when new birds are introduced into the flock. When examining a bird for body lice part the feathers quickly near the vent, as the lice move quickly, and then look for accumulation of nits. Lice may also be found on the back.

Wing lice are usually found on the under sides of the primary wing feathers; they move very quickly and appear black.

Head lice live on the top and back of the head and are dark grey. This variety is rare.

Fumigation Treatment

The main methods of treatment are fumigation or dusting. Fumigation is usually done by the use of a 40 per cent. solution of nicotine sulphate or a perch paint containing benzene hexachloride. The nicotine sulphate is applied to the flat, top surface of the perches just before the birds roost, on a still, reasonably warm night. The amount of solution used should be about 5oz. to 100 running feet of perch and may be applied with a small brush or as a fine trickle along the middle of the perch.

The trickle may be achieved by the use of special tops provided or by pouring the solution into a flat container or lid through which a small nail has been punched. The nail is withdrawn when the container is held directly over the perch. The nicotine is volatile at temperatures over 60 degrees F. and the heat from the birds' bodies generates fumes which rise among the feathers and kill the lice.

A second treatment is required within 8 to 10 days. Care should be taken that all birds occupy the treated perches. Perch paints containing BHC have fumigant properties and also a residual effect lasting for some weeks. One application should be sufficient, but the amount required is at least 1oz. to 10ft. of perch. The entire perch is usually painted. Commercial preparations include full directions for use, and prices appear comparable.

Any mixture left over should be stored as high as possible and out of reach of children.

[Fraser Niederer

Accumulations of droppings and dirt in a range colony house afford ideal conditions for mite infestation.

Dusting

Dusting is perhaps the oldest method and is more suitable for treating individual birds. A commercial preparation is usually used.

Dusting powders may contain DDT powder, benzene hexachloride dust, sodium fluoride, or other compounds. The powder is usually based on materials such as talc or fuller's earth.

Following are two methods of application:—

Pinch method: This consists of holding the bird by the wings and then ruffling the feathers and applying a pinch of the powder to the head, neck, back, breast and then below the vent, thighs, and under the wings. If possible rubber gloves should be worn and care must be taken that the powder is not inhaled, does not reach the eyes of the bird, or is not applied to an open wound.

Shaker method: In this method the bird is held while the powder is applied to the parts listed above. The

powder is shaken on and then rubbed into the skin. As the bird often receives an excess amount, the treatment should be given over a shallow metal tray to prevent waste.

When a number of birds are to be dusted the powder may be placed in the tray. The bird is held over the tray during treatment and excess powder then falls back into the tray.

The powder will not destroy lice eggs, but may remain on the bird long enough to kill young lice that hatch.

BHC powders are also used for dusting nestboxes and litter.

The use of naphthalene nest eggs has not proved very successful against lice.

Fleas

Occasional outbreaks of the European hen flea are reported. These fleas are usually found in fowl houses that have been left vacant without a thorough cleaning.

This pest will attack animals other than fowls and may be particularly objectionable to human beings. The female flea lays her eggs in dust or dirt. With the correct amount of humidity the eggs hatch into maggot-like larvae which feed on organic matter, dried blood, and flea faeces in the dust and litter.

After developing for about 10 days the larva spins a cocoon and remains inactive for a week or month, depending on the required temperature, and emerges as an immature, hungry flea. Immature fleas may live many months without food if the environment has sufficient humidity. Mature fleas also live without feeding, but when a host is available they may live for a year or more.

European fleas frequently leave the host, are blood-sucking insects, and are able to run rapidly and leap.

Their habit of sucking blood produces irritation and the egg production of birds attacked will drop and the birds will become nervous and unthrifty; the effect on young birds may be serious.

Control

The eradication of fowl fleas is sometimes extremely difficult and may take a considerable time, particularly when the house has an earth floor. The first step is to spray the house before the litter has been removed with a DDT or BHC solution, creosote, or old engine oil and kerosene. The litter should then be burnt with the assistance of oil and kerosene.

When all litter and dust has been removed the house should be sprayed again, left without new litter, and, if necessary, sprayed after another interval.

As fleas breed in dirt, it may be necessary to spray the ground near or under a wooden floor. All domestic animals should be kept well away.

Sunlight, dry weather, cleanliness, and cold retard infestation, but old droppings, old litter, darkness, dampness, and warmth favour development.

Crowbar Caused Serious Tractor Accident

THE photograph below reconstructs a serious accident with a tractor and trailer that like most of its kind arose from simple causes and the overlooking of elementary safety rules. Five minutes' work and expenditure of 2s. 6d. would have prevented it. The driver's injuries resulted in 6 weeks in hospital and it was a year before he was fit for heavy farm work again.

The trailer contained fencing equipment including a 6ft. 6in. crowbar. On a steep slope this crowbar slid forward and down through the tractor drawbar until it dug into the ground. As the tractor moved on, the drawbar forced the crowbar to spring upright and smash against the back of the tractor seat, striking the driver a glancing blow on the head at the same time. Knocked unconscious, the driver fell off the tractor and was run over first by the tractor wheel and then by the steel trailer wheel. Injuries to his spine fortunately did not cause paralysis, but the long period in hospital and the year's convalescence were a high price to pay.

A secure front board (in its simplest form, a short length of 9in. x 1in. timber worth about 2s. 6d.) on the trailer would have prevented this accident. Many farmers have trailers requiring this addition. The penalty for negligence can well be serious injury to the driver and costly damage to equipment.

—L. H. WESTON, Machinery Instructor,
Department of Agriculture, Dunedin

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Temporary Pasture Mixtures in North Otago

THOUGH permanent pastures are the basis of New Zealand's livestock industries, there is in many districts a place for temporary pastures. This article by D. G. Reynolds, Instructor in Agriculture, Department of Agriculture, Oamaru, discusses their use in North Otago.

IN North Otago permanent pasture suffers severely from the prevailing climate and this is not to be wondered at when it is realised that modern concepts of permanent pasture do not envisage such conditions. A 22in. average annual rainfall, with prolonged periods of drought likely at any time of the year, and strong, hot, drying winds are not in any way aids to the long-term survival of the present components of a permanent pasture.

So far no endeavour has been made to select permanent species for such an environment, which generally leads to a cycle of initial good pasture that gradually becomes poorer with consequent lower stocking and lower fertility. Pest control is also rendered more difficult under a permanent pasture system and the cost of prevention is relatively greater. Under temporary pasture better control of grass-grub would be effected and a higher fertility maintained.

Ingress of weeds is another undesirable feature of permanent pasture, especially in a cropping district. In a dry district the short-term pasture offers far greater scope for saving small seeds, which can be an important source of revenue.

A temporary pasture can be considered as one that is intended to last a relatively short period and in that time give production in excess of that expected from permanent pasture, besides providing feed at periods of normal shortage. Often the saving of small seeds from temporary pasture may be highly profitable in favourable seasons. In North Otago this "short period" can be taken as anything from 6 months to 2½ years. Permanent pasture is intended to last a minimum of 4 to possibly 6 years.

There is little doubt that temporary pastures can fulfil a very valuable place in farm practice in North Otago, giving higher, more dependable, and better distributed production than do permanent pastures, which, with very few exceptions, cannot be maintained long at high levels of productivity.

The use of temporary pastures enables better and more direct action to be taken in raising fertility by manurial treatment and increased stocking. The farm benefits considerably, since temporary pastures provide a means of establishing the most productive species best suited for the soil and environment, and they also provide a quick means of incorporating new and improved strains in swards.

The species and strains generally sown in temporary pasture provide greater flexibility in utilisation than those in permanent pasture. Finally they are admirable for controlling weeds of all kinds and also parasites harmful to stock.

These facts leave little doubt that there is a place for the temporary pasture on the majority of North Otago farms.

HEADING PHOTOGRAPH: Waiareka Valley, Weston, North Otago. Temporary pastures can be very valuable in North Otago, giving higher, more dependable, and better distributed production than do permanent pastures, which with very few exceptions cannot be maintained.

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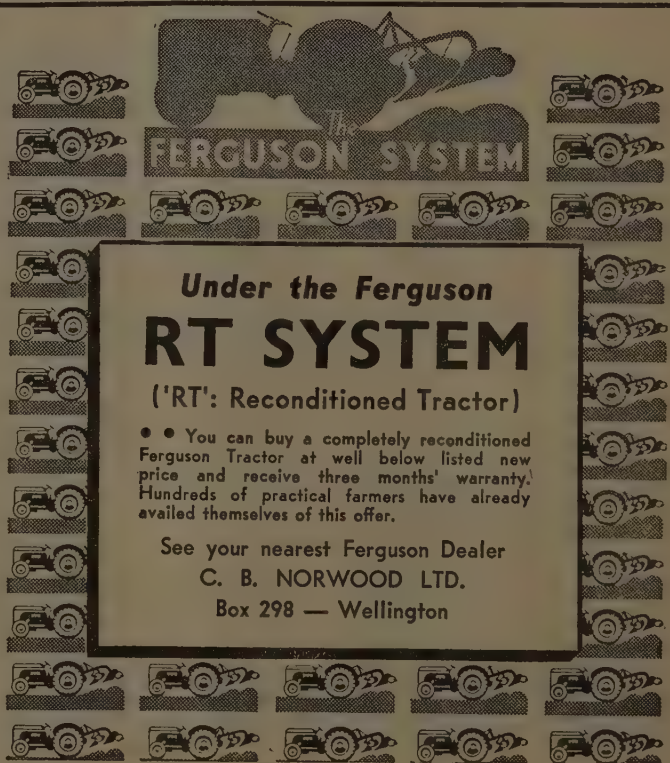

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Seed Mixtures

Different times and conditions of sowing and the intended utilisation of temporary pastures have a definite bearing on the seed mixtures to be used. There are not a great many species and strains to choose from for temporary pastures, and the majority of seed mixtures recommended follow a fairly similar pattern, the main components being short-rotation or Italian ryegrass and one or more clovers.

On arable farms in North Otago temporary pastures can be made to fill a variety of roles requiring differing mixtures according to their place in the rotation, the time of sowing, and the use intended for them. Six examples of how temporary pasture can be fitted into farm practice are given here (it is assumed that necessary manurial practices will be observed):—

(a) Sown after a forage or cash crop in autumn with the intention of providing both winter feed and a cut of hay or grass seed in the following summer. If the intention is to save seed, a choice must be made between short-rotation and Italian ryegrass. This will depend on the relative reliability of harvesting and profitability of the crop. The mixture per acre would then be:—

15lb. of Certified Pedigree or Mother short-rotation or Italian ryegrass.

2lb. of Certified Pedigree or Mother white clover.

No red clover should be included in this mixture.

If the pasture is intended for hay or grazing only, Certified Standard Italian or short-rotation ryegrass can be used and the white clover replaced by 3lb. of Certified Standard Montgomery red clover or cowgrass. Should the farmer intend taking seed of either of these last-named varieties in the second year, the class of seed sown should be Certified Pedigree or Mother.

(b) Sown with a summer or winter forage crop. The sowing often consists of 10lb. of Certified Standard short-rotation or Italian ryegrass in addition to the forage crop seed and is intended to guard against failure or partial failure of forage crops and to lengthen their period of utilisation. The inclusion of grass should in no way alter the rotation into which the forage crop is fitted.

(c) Sown on a 3 months' fallow after old pasture to improve soil conditions and control or weaken weed grasses and annual weeds. It is intended here that the pasture should provide feed and also build up fertility which will be of value when the paddock is ploughed within the next 2 years. The mixture per acre would be:—

15lb. of Certified Standard short-rotation ryegrass.

2lb. of Certified Permanent Pasture white clover.

1½lb. of Certified Standard Montgomery red clover.

1½lb. of Certified Standard cowgrass.

(d) As a prelude to permanent pasture with the intention of promoting an over-all high standard of pasture production on the farm. The temporary pasture would be sown after a crop, or on a fallow after a crop, either forage or cash, with the intention of leaving it down no more than 2½ years, at the end of which the paddock would be summer fallowed and sown to permanent pasture in autumn. The mixture per acre would be:—

20lb. of Certified Standard short-rotation ryegrass.

5lb. of Certified Permanent Pasture perennial ryegrass.

2lb. of Certified Permanent Pasture white clover.

3lb. of Certified Standard red clover (either Montgomery or cowgrass).

(e) As the sole pasture on farms carrying a large area of lucerne or where extensive cash cropping is practised. The temporary pastures here will be considered mainly as a stock carrying proposition, but on cropping farms stock are secondary to cash crops and mixtures suitable for seed production will then have to be considered.

For ryegrass and white clover seed production 1 bushel of Certified Pedigree or Mother seed of the chosen ryegrass species with 2lb. to 3lb. of Certified Pedigree or Mother white clover seed is used. For clover seed production the mixture is altered to include up to 25lb. of ryegrass seed of a lower certification class (more than one species may be included in such a mixture) with 1lb. to 2lb. of Certified Permanent Pasture white clover seed and 3lb. of Certified Pedigree or Mother cowgrass or Montgomery red clover seed, depending on which type of red clover is desired.

(f) To renovate old pasture after a light top working. The success of this will depend largely on the weather and the effectiveness of the working. This method is useful to incorporate better species into an old pasture with the intention of securing higher productivity and of increasing fertility to ensure easier working and heavier crops when the area is subsequently ploughed. The mixtures used may include any species that suit local conditions.

Grazing Management

For temporary pastures to be really effective their grazing management is important. Autumn sowings should be early enough to allow one or preferably two grazings before winter. This encourages the grasses to stool and ensure a better cover for winter and spring feeding. If the pasture is allowed to become rank in the first few months, there is every danger of suppressing the clovers almost entirely and rendering the paddock useless after the first year.

Many Advantages

Temporary pastures provide a rapid and easy means of boosting feed supply and are relatively safe compared with other supplementary fodders. Used with lucerne they can raise the carrying capacity markedly and at the same time increase fertility. The danger from attack by grass-grub is not severe and even if losses do occur, they do not upset the farm rotation to the same extent as if the paddock were intended to be down for a number of years.

Temporary pastures can fill a very real place in the farming economy of many North Otago farms.

"Roses for New Zealand Conditions": Frank Mason

THIS small publication on the culture of roses in New Zealand is essentially a practical book. Mr. Mason drew on his years of experience and condensed them into a useful guide to rose growing.

Specialist rose growers may not find all the answers to their problems, and it would have been desirable to include more information on summer pruning.

However, as an introductory guide to rose growing and to combat the more extreme theories on certain aspects of rose culture "Roses for New Zealand Conditions" will provide the essential information required for growing roses satisfactorily in the garden.

—*J.P.S.*

A. H. and A. W. Reed. 4s. 6d.

"Milk and Butterfat Recording": E. D. Ashton. This is the third in the series of Technical Communications of the Commonwealth Bureau of Dairy Science and Technology and is a world survey on milk and butterfat recordings. The book is divided into two main parts. The first deals with the historical development of milk recording and butterfat testing, the organisation and financing of societies and associations, and the use of records by the various interested bodies. The second part gives in considerable detail the growth and organisation of recording societies in all countries from which data are at present available.

The Commonwealth Agricultural Bureaux, Farnham Royal, Bucks., England. 30s. in Britain.

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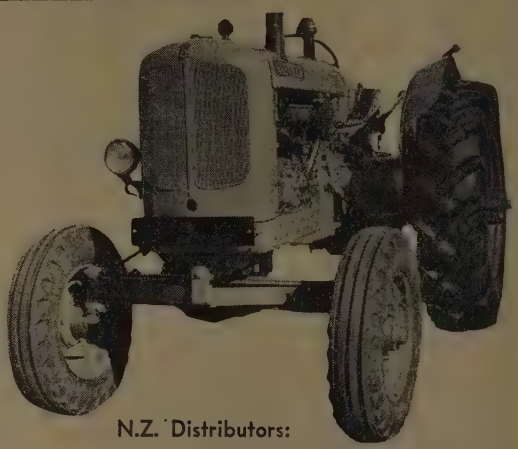

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Hive Management during the Honey Flow

Seasonal Notes for the Domestic Beekeeper

By A. W. BENNETT,
Apiary Instructor, Department of Agriculture, Hamilton

THIS is generally the most anxious period of the season for a beekeeper who by careful attention to hive management has brought his hives to full strength and awaits the first signs that the main honey flow has begun.

ALL hives should by now be "boiling over" with bees ready to take advantage of the flowers as soon as they begin to yield nectar. Those hives which have failed to respond to apiary management and have a mere handful of bees should be united with some of the stronger hives, as such weak colonies are never capable of gathering a crop of honey. Combs and supers in weak hives can be put to much better use in other hives.

Last month's notes mentioned that care had to be taken to prevent the bees swarming when they reach this stage. It is also necessary to keep a close watch on stores should a spell of bad weather be experienced at this period. Strong colonies use up a very large amount of honey at this time and in a few days a hive can become completely bare of stores if no nectar is available in the fields. The strongest hives use the most stores in bad weather and so are the most vulnerable.

By this time all extra equipment should have been assembled and be ready for supering up as soon as conditions indicate this is required. It is sound practice always to check over hives for signs of any disease before

A super of 10 frames of foundation being placed on a hive over the excluder.

A deep frame to hold eight sections being put into the middle of a super.

A section fitted with a full sheet of super foundation and one fitted with a starter of medium brood foundation.

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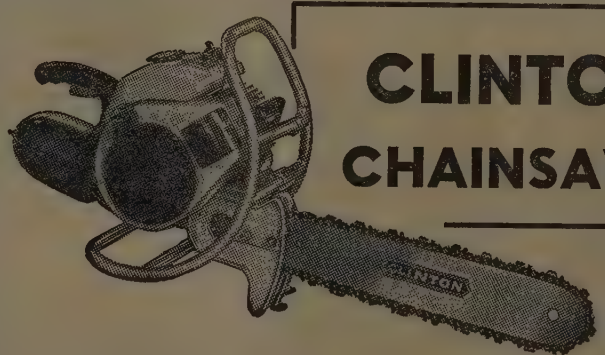

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HIVE MANAGEMENT DURING THE HONEY FLOW

starting to put on supers. Though the loss of a hive at this period considerably reduces the crop, there is no sense in losing valuable new equipment also.

It is natural for bees to produce wax at this time, so the opportunity should be taken to get as much foundation drawn out as possible. Very often if this wax is not used up by the bees in drawing out new combs, the tiny white scales of pure beeswax can be found covering the floor board. A full super of foundation to be drawn out should be spaced 10 frames to a super. This is to encourage the bees to concentrate as quickly as possible on the foundation. It also assists in keeping the new combs more even as they are being drawn out. When the sheets of foundation have been completed one may be removed and the remaining nine evenly spaced out so that they can be well filled with new honey.

If only a few frames of foundation are required to fill a super, drawn comb and foundation can be spaced alternately. Supers of drawn combs are generally spaced nine to a super. This results in a comb much easier to uncap and generally more honey than if ten had been used. When white trimmings of fresh wax show along the top bars conditions are right for the addition of another super. Don't wait until the combs are fully capped before adding the next super, which should be placed under the full one.

A frame holding eight sections and one to hold four sections for use in the shallow super. The second section from the right is fitted with a starter of heavy comb foundation.

A super mixed with drawn combs and frames of foundation on a hive above the excluder.

Foundation should not be put on a hive near the end of the honey flow, as the bees tend to eat the wax away, thus spoiling what should have been a perfect comb.

A wise practice during the honey flow is never to place more supers on the hive than are required. Too much empty space tends to discourage the bees from filling the comb to the brim with honey.

For the beginner who wishes to obtain a few sections for his own household it will be quite all right to place a frame with eight sections in the super between two combs well filled with honey. This should be done during the honey flow. As soon as the sections are capped they should be removed and replaced with fresh ones. Foundation for sections is very thin, about 28 sheets to the pound. If none of this is available, a small piece of medium foundation should be used as a starter.

Once all combs are on the hives preparations should be made for extracting. This aspect of a beekeeper's activities will be dealt with in next month's notes.

Vaccination against Contagious Abortion

APPLICATIONS by farmers for vaccination of their calves against contagious abortion in 1957 are now due. The charge is 2s. per calf irrespective of the number. The closing date for applications for dairy calves is 14 January and for beef calves 31 July.

As in previous years members of veterinary clubs should apply to the secretary of their club, and other farmers should apply to their nearest Livestock Instructor or private veterinary surgeon. Applications to Livestock Instructors must be accompanied by a cash payment of 2s. per calf.

It is desirable that applications should be sent in as early as possible so that vaccinating officers can arrange the work efficiently. Farmers are therefore requested to forward their applications by 4 January. Application forms can be obtained from any Livestock Instructor.

Control of Weeds in Lawns

MANY lawns that are laid down with much care are subsequently ruined by invasions of weeds due very frequently to a lack of knowledge of the correct manurial practices for preserving a uniform, weed-free turf. In early years drastic measures, involving the use of arsenical preparations, sodium chlorate, etc., were necessary to destroy such weeds, but since the advent of the modern hormone weedicides control has been much easier and more effective. In this article L. J. Matthews, Weeds Research Officer, Department of Agriculture, Wellington, discusses some aspects of the modern control of weeds in lawns.

THE weeds that infest established grass lawns may be regarded as of three types—flatweeds, clovers, and grass weeds. The main flatweeds include dandelion, catsear, and hawkbit; the clovers are mainly white clover, suckling clover, and subterranean clover; and the grasses include all grasses other than browntop and chewings fescue. Up to the present very little work has been done on lawns of *Cotula* spp., *Dichondra repens*, or *Hydrocotyle* spp., usually referred to as "weed" greens, so no recommendations can be made.

Flatweeds

Flatweeds are quite susceptible to the hormone type of weedkiller and an annual spraying in March or biannual spraying in March and September is usually sufficient to keep them under control. The main weeds are various plantains, dandelion, catsear, cranesbill, field daisy, hawkbit, hawkweed, and storksbill. These may be controlled with any of the MCP or 2,4-D proprietary lines of hormone weedkillers at ½lb. to 1lb. of acid equivalent per acre. Onehunga weed is also readily killed by these materials.

Weeds that are more difficult to destroy are yarrow, sorrel, *Hydrocotyle* spp., pearlwort, and chickweeds. Control of these weeds is not wholly satisfactory with hormone preparations, and if they are dominant low-volatile esters of 2,4-D should be used at up to 2lb. of acid equivalent per acre, and more than one treatment is necessary for their control.

All these weeds are more readily killed as seedlings, but they can be successfully treated up to the early flowering stage. If the plants are mature, as much leaf as possible should be allowed to grow on them before the spray application is made, and a week or so should elapse after that before the area is mown. In all cases the weeds should be growing vigorously before they are sprayed. Consequently, spring and autumn applications are more successful than those applied in periods of plant dormancy. Poor results are obtained if the weedkillers are applied after a hot, dry spell.

Clovers

Clovers are often desirable in a home lawn, as they supply nitrogen to the grasses present, and give a greener appearance over-all to the lawn in dry periods when grasses are normally parched. Most home lawns are not manured regularly with a nitrogenous fertiliser, so the clovers present help to meet this deficiency.

In a well-managed lawn all species of clovers may be readily eliminated by an application of a low-volatile ester of 2,4,5-T at up to 3lb. of acid equivalent per acre in spring or autumn. One application annually is usually sufficient, but if total elimination is desired, a spraying should be given each autumn and spring until all clover is destroyed. If this is done, the rate of application could be reduced to 2lb. of acid equivalent after the initial treatment, with a further reduction to 1½lb. or 1lb. in subsequent dressings as the clovers weaken. A dressing of nitrogenous fertiliser should follow each application of 2,4,5-T, to stimulate grass growth.

As preparations of 2,4-D and MCP are not sufficiently lethal to eliminate clovers, and 2,4,5-T at economic rates of application is not effective against flatweeds, a combination of MCP or 2,4-D with 2,4,5-T has to be used to destroy both these groups of plants. A suitable mixture would be 2,4-D and 2,4,5-T mixed in the ratio of 1 to 3 and applied at a total of 4lb. of acid equivalent per acre. The concentrates can be mixed provided the same type of ester of the same proprietary lines is purchased.

Grass Weeds

Spot applications of TCA at 1oz. per 30 plants will give satisfactory control of perennial weed grasses such as fog and paspalum. The TCA can be applied either dry in a filler or spreader such as superphosphate or in water. In either method the material should be applied so that as little as possible falls on desirable species. TCA should be applied when the soil is moist and further rainfall is expected. If it is applied under dry conditions, poor control results. The areas that are exposed after the destruction of weed grasses can be oversown 2 to 3 months after treatment.

Dalapon may be used as an alternative to TCA and applied in the same way, except that the application should be made when a day or so of fine weather can be expected. Oversowing should be practised as with TCA. Where *Poa annua* is dominant dalapon applied at 1lb. to 2lb. per acre (3 to 6 grammes per 25 sq. yds.) as a spray will successfully control this weed. If care is taken not to allow the spray to reach the ground and 1 to 2 days of fine weather follow the application, oversowing of browntop and chewings fescue can be carried out immediately. If the spray reaches the ground, the germination of the sown species can be seriously reduced.

Meteorological Records for September

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in Inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	54.8	+ 1.0	70.5	35.9	6.32	15	+ 1.18	3.54	5	182
Auckland	160	56.1	+ 1.6	69.2	41.4	6.52	13	+ 2.73	1.87	27	206
Tauranga	10	53.2	+ 0.6	69.4	36.3	4.35	15	+ 0.13	1.73	27	181
Ruakura	131	52.2	+ 1.3	71.7	29.9	2.94	18	— 0.74	0.45	11	191
Rotorua	975	51.1	+ 1.4	73.7	31.1	5.04	13	+ 0.47	1.22	11	161
Gisborne	12	52.8	+ 0.7	72.7	34.8	4.57	16	+ 1.95	2.02	7	177
New Plymouth ..	160	53.2	+ 1.5	64.5	36.0	3.56	11	— 1.34	0.79	25	207
Kartol	2125	46.9	+ 1.9	67.9	25.9	2.07	9	— 2.20	0.61	13	
Napier	5	53.1	+ 1.1	72.0	35.0	1.67	12	— 0.30	0.58	5	193
Wanganui	72	52.8	+ 0.7	68.2	37.3	2.89	10	+ 0.35	0.58	13	224
Palmerston North ..	110	52.4	+ 1.9	68.8	32.2	2.30	10	— 0.71	0.63	29	204
Waingawa	340	50.5	+ 1.2	71.6	29.0	1.92	11	— 1.35	0.65	29	210
Wellington	415	52.0	+ 2.1	63.2	38.9	1.63	9	— 2.21	0.32	27	221
Nelson airfield ..	5	48.9	+ 0.7	66.3	30.2	2.21	9	— 0.95	1.42	11	227
Blenheim	12	50.5	+ 0.3	69.9	30.5	2.02	11	— 0.26	0.67	11	224
Hokitika	15	49.8	+ 2.0	69.2	32.0	2.76	11	— 5.86	1.04	11	175
Hanmer	1270	47.6	+ 1.5	71.0	25.0	2.38	12	— 2.05	0.72	27	186
Christchurch ..	22	50.0	+ 1.3	73.5	29.5	3.15	8	+ 1.09	1.40	27	178
Ashburton	323	50.6	+ 2.7	76.2	27.4	3.45	10	+ 0.83	1.62	27	172
Timaru	56	49.6	+ 1.7	74.2	31.1	2.17	8	+ 0.22	0.95	26	168
Alexandra	520	48.8	+ 1.7	72.1	29.9	0.44	7	— 0.38	0.14	29	134
Taieri	80	48.5	+ 0.8	74.5	31.5	0.86	11	— 1.07	0.22	7	99
Invercargill airfield ..	0	48.2	+ 2.5	65.8	28.1	1.73	12	— 1.49	0.58	13	84
Chatham Islands ..	140	48.4	+ 0.2	63.1	33.2	2.70	15	+ 0.25	0.83	12	

Tractor and Farm Implement Operating Costs

▲ The header harvester is perhaps the most complicated implement among modern farm equipment in New Zealand and is therefore relatively expensive to operate. If it has enough work to do, however, it is almost essential to a grain and seed growing farmer. National Publicity photo.

By R. I. C. MACPHERSON,
Investigating Officer, Department of Agriculture, Wellington

DURING and since the last war there has been a rapidly increasing demand for food which in some of the Western countries, including Australia and New Zealand, has been coupled with a quite serious shortage of farm labour. This has been one of the major factors resulting in a remarkable increase in farm mechanisation, particularly in America, the United Kingdom, Australia, and New Zealand. The trend toward mechanisation in New Zealand started at a fairly steady pace in the 1920s, but it was not until about 1946 that the present really spectacular progress began.

PROBABLY the most useful yardstick available for judging the degree and increase of mechanisation on New Zealand farms is the number of agricultural tractors, which is shown in Table 1 with population and livestock statistics.

In spite of the disproportionate figures of agricultural workers compared with the total population increase, New Zealand has been able to make great progress in agricultural production. Today the output per agricultural labour unit is probably the highest in the world. The main interrelated factors which have enabled New Zealand to reach this position are improved farm management, a high degree of mechanisation, and a favourable climate.

TABLE I—TRENDS IN TRACTOR, POPULATION, AND LIVESTOCK NUMBERS

Year	Total population	Agricultural workers as percentage of total population (approx.)	No. of agricultural tractors	Total cows in milk	Total sheep
1921	1,252,206	11	380	890,220	23,285,031
1926	1,392,073	9	2,025	1,181,441	24,904,993
1931	1,498,416	*	5,023	1,499,532	29,792,512
1936	1,565,263	10	5,710	1,823,358	30,113,704
1946	1,710,680	9	18,940	1,682,529	33,974,612†
1951	1,917,934	7	40,310	1,918,782	34,786,386
1954	2,087,740	7	55,632	2,019,685	38,101,954

* Not available † 1945

Number of Tractors

The most recent estimate of agricultural tractors working on farms is 62,000, and if these are valued at £400 each, the total capital involved amounts to about £25,000,000. If it is assumed that there are approximately 75,000 economic farm units included in the 92,000 agricultural holdings in New Zealand, the capital value for tractors is about £330 per farm. When it is considered that these values do not include other farm inplements and equipment it can well be appreciated that the investment for mechanisation has become a most important component in farm capital. This is further illustrated in Table 2, showing the basic items of equipment, with their

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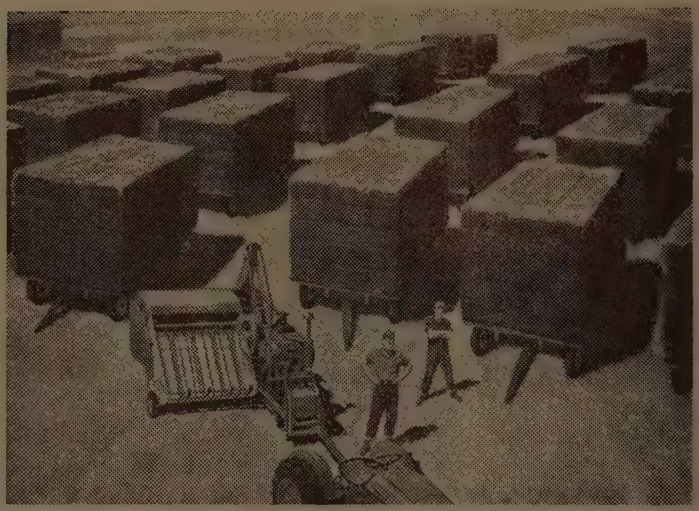

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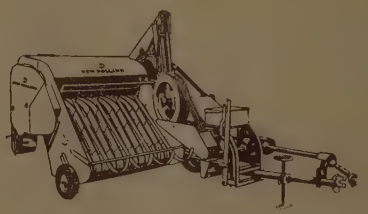

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estimated values, which are likely to be found on typical farms in New Zealand:—

TABLE 2—VALUE OF BASIC EQUIPMENT ON TYPICAL FARMS

Dairy farm (120 acres)	Value £	Mixed farm (300 acres)	Value £
Milking machine	300	Tractor	500
Tractor	350	Plough (3 furrow)	90
Trailer	35	Grubber	50
Discs	60	Harrows	35
Plough (2 furrow)	65	Drill	150
Harrows	35	Roller	50
Topdresser	100	Header harvester	700
Mower	100	Trailer	45
Sweep	20	Truck	500
¼ share in baler	200		
Totals	£1,265		£2,120
Estimated total capital value of farms	10,800		18,000
Equipment as percentage of total capital value	12		12

The above table is of course not complete and is merely included to indicate the high proportion of total capital that is likely to be invested in farm machinery. It should be noted that the values given for the implements are not replacement costs but merely estimated present values.

Thus it can be seen that a working knowledge of farm machinery operating costs is of vital concern to the New Zealand farmer, and it is extremely desirable to establish a uniform and straightforward means of calculating such costs. To this end the Department of Agriculture has been collecting and analysing information on farm machinery costs, in particular on tractor operating costs.

Tractor Operating Costs

The methods of collecting data on tractor operating costs were described in the April 1953 issue of "The Journal of Agriculture" under two main headings. These were a field survey which was carried out in Canterbury in 1947 and the tractor recording scheme, which was the main subject of the article. The scheme is worked on a log book principle, with co-operating farmers sending in monthly reports of work done and expenses incurred by their tractors. This information is analysed and returned to each farmer in a summarised form at the completion of each year's recording. It enables the Department to obtain a steady stream of up-to-date operational cost data.

By correlating information from the above two sources with extra details obtained from some of the chief tractor agents it has been possible to build up data from which the average operating costs of various sizes and types of agricultural tractors can be assessed. Such assessments are, of course, subject to a number of limitations and some assumptions have had to be made. The cost structure, which will now be shown, is in effect theory, backed as much as possible by field facts. For example, it has been assumed that the economic working life of a tractor is 10,000 hours and that on New Zealand farms 12 to 15 years will be required for this amount of work to be done. It is assumed that small wheeled tractors will work 667 hours per annum for 15 years and that other wheeled and tracklaying tractors will work 833 hours per annum for 12 years.

Ploughing can be one of the more expensive cultivation operations. The tractor has to work hard and the plough is subject to considerable wear and possible breakages.

To obtain costs for various size groups a fairly wide range of the most commonly used tractors was taken and subdivided according to horse-power and type. These groups and costs are shown in Table 3.

These tractor groups were costed under four main headings (full details of calculation methods used are not given):—

1. Fuel, oil, and grease
2. Repairs, maintenance, and replacements
3. Major overheads
4. Sundry overheads

After consumption rates were established **fuel, oil, and grease** costs were easy to assess, but this was not so for **repair, maintenance, and replacement** charges, and considerable investigation was necessary before a complete list of these expenses, which could be expected during the life of each of the main types of tractors, could be established. These costs were then compared with current tractor prices and a scale of percentages was calculated enabling quick estimates to be made of the likely expenditure on repairs, maintenance, and replacements during the lives of the tractors being studied.

For wheeled tractors the total charges were found to vary approximately from 80 per cent. of the cost price of

TABLE 3—TRACTOR GROUPS FOR WHICH COSTS HAVE BEEN ASSESSED

Tractor groups		Average rated drawbar. horsepower	Average price £
Small wheeled, under 12 h.p.	(petrol)	7.4	450
Light/medium wheeled, 12 h.p. and under 20 h.p.	(petrol)	16.7	700
Medium wheeled, 21 h.p. and under 26 h.p.	(petrol)	23.5	830
	(diesel)	21.5	860
Heavy wheeled, 27 h.p. and under 40 h.p.	(petrol)	32.0	1,070
	(diesel)	30.1	1,090
Small tracklaying	(petrol)	16.5	1,065
Medium tracklaying	(diesel)	24.7	2,000
Medium/heavy tracklaying	(diesel)	32.0	3,000

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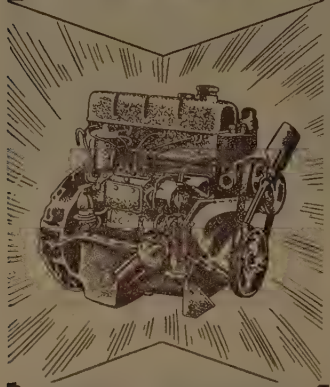

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light to medium tractors to 65 per cent. for the larger machines. With tracklaying machines the repair bill ranged from 70 per cent. of the cost price of the small tractors to 75 per cent. for the larger ones. The fact that these percentages of cost prices decreased for the larger wheeled tractors and increased for the larger tracklaying ones is probably because the latter are essentially used for work under harder conditions than are wheeled tractors. In other words, large wheeled tractors do more work but under much the same conditions as small wheeled tractors, but tracklaying tractor size is increased not only to do more work but also to handle harder work.

Major overhead costs include interest and depreciation. Interest is obtained by charging the current rate on half the cost price of the tractor, thus giving an average annual charge, and depreciation is calculated from the assumed 10,000 hours' life of tractors.

Sundry overheads are small annual charges which include such items as insurance, housing or garaging costs, and registration fees.

Thus estimated hourly operating costs may be calculated as follows:—

1. Fuel, oil, and grease—consumption per hour multiplied by current prices.

2. Repairs, maintenance, and replacements—estimated total divided by 10,000 hours.

3. Major overhead costs—

   (a) Interest — annual charge divided by hours worked per year; that is, 667 or 833 hours.

   (b) Depreciation—cost of tractor divided by 10,000 hours.

4. Sundry overheads — annual charge divided by hours worked per year.

In the next two tables cost details calculated by the methods explained are shown, the first giving the estimated operating costs per hour and the second showing the main costs as percentages of the totals.

The buckrake is a relatively new implement which has proved a great asset to farmers for silage making.

TABLE 5—ITEMS OF OPERATING COSTS AS PERCENTAGES OF TOTAL COSTS

Group	Fuel, oil, and grease	Repairs, maintenance, and replacements	Major overhead	Sundry overhead	Total
Wheeled tractors					
Small .. .. (petrol)	42	22	33	3	100
Light/medium . (petrol)	48	18	32	2	100
Medium .. (petrol)	51	16	31	2	100
(diesel)	39	18	41	2	100
Heavy .. .. (petrol)	54	13	32	1	100
(diesel)	41	17	40	2	100
Tracklaying tractors					
Small .. .. (petrol)	42	19	38	1	100
Medium .. (diesel)	26	47	1	100	
Medium/heavy . (diesel)	23	28	48	1	100

It will be noted that there is a difference of approximately 2s. per hour between the operating costs assessed for the heavy wheeled petrol tractor and the heavy wheeled diesel tractor. Though the estimated operating costs have shown that the diesel machines are cheaper to operate, the difference in this instance is somewhat exaggerated because on average they were slightly lower-powered machines than the petrol driven ones of the same group.

From the data given in Table 5 it is relatively easy for any farmer to make a rough calculation of the probable operating costs for his tractor. Provided he knows the fuel, oil, and grease consumption, plus current prices, reference to the table will show what percentage these costs are likely to be of the total operating costs; for example,

	d.
1½ gallons of petrol per hour at 2s. 2d.*	39.0
0.2 pint of oil per hour at 12s. 9d. per gallon ..	3.8
0.02lb. of grease per hour at 1s. 9d. per pound	0.4
	43.2

* Rebate taken off.

Therefore, if fuel, oil, and grease represent 51 per cent. or about half of the total, as for a medium-sized

TABLE 4—SUMMARY OF OPERATING COSTS DURING THE ESTIMATED ECONOMIC LIFE OF TRACTORS (IN PENCE PER HOUR)

Group	Fuel, oil, and grease	Repairs, maintenance, and replacements	Major overhead	Sundry overhead	Total*
Wheeled tractors					s. d.
Small .. (petrol)	18.7	9.7	14.7	1.4	44.5 (3 8½)
Light/medium .. (petrol)	32.3	11.7	21.6	1.2	66.8 (5 6¾)
Medium .. (petrol)	42.9	12.9	26.0	1.2	83.0 (6 11)
(diesel)	27.8	13.5	27.8	1.3	70.4 (5 10½)
Heavy .. .. (petrol)	56.5	14.0	33.4	1.3	105.2 (8 9¼)
(diesel)	33.4	14.2	33.5	1.3	82.4 (6 10½)
Tracklaying tractors					
Small .. .. (petrol)	36.3	16.6	33.2	1.2	87.3 (7 3¼)
Medium .. (diesel)	34.9	35.6	62.4	1.5	134.2 (11 2¼)
Medium/heavy.. (diesel)	43.8	53.8	93.6	1.8	193.0 (16 1)

* Excluding driver's wages.

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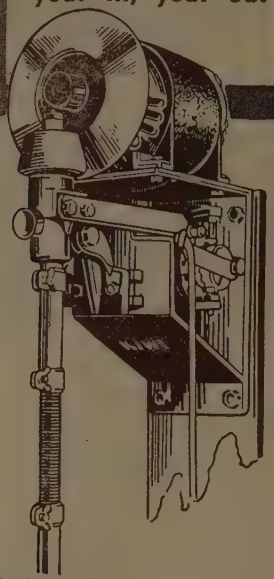

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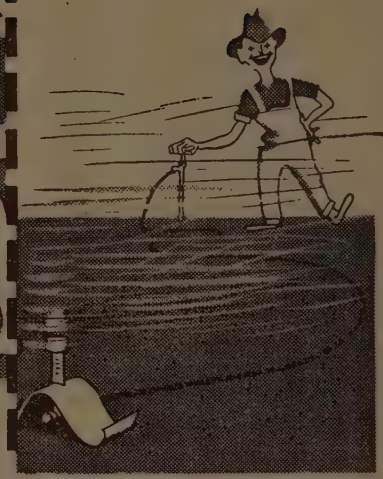

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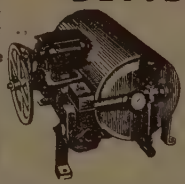

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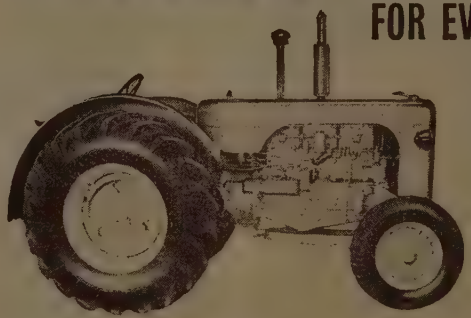

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tractor, the total operating costs will be 85d. per hour, or 7s. 1d. The owner has now only to add the driver's hourly wage rate to obtain a fair estimate of the hourly cost of running his tractor.

Implement Costs

This, then, leads to the next stage of farm machinery costs, namely, the cost of operating implements which will be hauled by the tractor. Indeed, a knowledge of these charges is necessary if a farmer wishes to obtain a broad picture of what his various jobs such as cultivation, harvesting, or land development are costing him.

Implement costing is rather more difficult than tractor costing mainly because less detail is available and therefore broader assumptions have to be made. With tractors upward of 50 per cent. of their operating costs (for example, fuel, oil, and grease costs) can be fairly easily assessed, but this is not necessarily so with implements, which frequently show wider variations in operating costs, according to the type of soil and topography in which they are working, the treatment they receive, and the number of working hours.

However, from field surveys which have been recently carried out by the Department a considerable amount of information has been accumulated which is now considered sufficiently reliable to use as indicators of probable operating costs for some of the more commonly used implements.

The basic items of information assembled to obtain the hourly operating charges on individual implements were:—

1. The current replacement values.
2. The estimated present values.
3. The estimated useful life of each implement.
4. Repair and maintenance work per annum, with costs.
5. Average number of working hours per annum.

It was then possible to formulate operating costs for each implement in the following manner:—

(a) **Major overhead costs:** Interest was calculated at 5 per cent. on the present values, while the depreciation rates, which vary according to the estimated useful life of each implement, were applied to the replacement values. For example, an implement with an estimated useful life of 15 years and a replacement value of £200 will have a depreciation rate of 6.7 per cent. and an annual depreciation charge of £13 8s.

(b) **Repairs and maintenance:** As with tractors this proved a difficult item. There are really three sections to it, namely, ordinary maintenance—which is mostly a labour charge—repairs done by the farmer, and repairs done by outside firms. Not all these costs will occur every year and therefore, as with tractors, it was necessary to build up a complete repair programme covering the whole life of each implement before an average annual charge could be arrived at. Apart from labour charges, items which had to be taken into account were major overhauls, regular replacements (such as plough shares, skeiths, mouldboard renewals, and grubber tips), plus allowances for breakages. As an example of these costing methods Table 6 shows the actual details and costs which were set out for a typical range of implements likely to be found on a Canterbury mixed farm.

TABLE 6—ESTIMATED ANNUAL OPERATING COSTS AND WORKING HOURS FOR IMPLEMENTS ON A CANTERBURY MIXED FARM

Implement	Replacement value	Present value	Interest charge	Depreciation charge	Repairs, etc.	Total annual cost	Total hours worked	Cost per hour
	£	£	£	£	£	£		s.
Plough (3 furrow)	195	88	4.4	5.9	23.7	34.0	205	3.3
Grubber (13 tine) ..	145	48	2.4	7.3	8.4	18.1	194	1.9
Harrows (5 leaf)	42	32	1.6	1.7	1.6	4.9	85	1.1
Roller (9ft. Cambridge)	127	50	2.5	5.1	1.0	8.6	60	2.8
Drill (15 coulter) ..	350	122	6.1	14.0	10.8	30.9	62	9.9
Trailer (3 tons)	110	46	2.3	5.5	1.9	9.7	69	2.8
Spray equipment ..	50	40	2.0	2.5	2.3	6.8	35	3.9
Header (6ft.; engine functioned)	1,377	688	34.4	114.7	62.3	230.8*	123	37.5
						343.8	833	

* Includes £19 8s. for fuel.

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The drill is a fairly complicated and expensive implement. As it is used only for a short period each season, its hourly operating costs are likely to be relatively high.

Thus, the approximate annual operating costs for the above range of implements is £344, and the aggregate hours worked are 833. If it is assumed that a medium to heavy, petrol-driven wheeled tractor is used, an additional charge of about 7s. 6d. x 833, or £312, is incurred. This, then, gives a total cost of £656 per annum for operating both implements and tractor, excluding the driver's wage.

Importance of Capital Costs

When assessing implement operating costs farmers will naturally think first of the amounts of money they have paid out in hard cash, and as with tractors they will tend to overlook the invisible overhead costs of interest and depreciation. The importance of these costs is emphasised in Table 7, which gives a break-up of the various items of cost as a percentage of the total operating costs.

Costs for Block of Wheat

If it is desired to estimate the cultivation and sowing costs for a particular crop, for example, 30 acres of wheat out of grass in Canterbury, it is necessary to apportion that part of the total implement costs which is applicable to the crop in question. This was done by using the following survey data:—

1. Cultivation practice and implements used.
2. Operating speeds and implement costs per hour.
3. Tractor operating costs.
4. Labour costs.

The operating costs per hour for implements as shown in Table 6 were then applied as follows:—

The total operating costs for implements and the total implement hours worked as shown in Table 8 should almost coincide with the total tractor hours worked on the operations listed.

Therefore, to cultivate and sow a 30-acre block of wheat out of grass the estimated costs (excluding those for seed and fertiliser) are as follows:—

	£
Implement costs	29.1
Tractor costs (190 hours at 7s. 6d. per hour)	71.3
*Labour (204 hours at 4s. 8½d. per hour	48.0
Total for 30 acres ..	£148.4
Cost per acre	£4.9

* Extra man on drill

TABLE 8—OPERATING COSTS PER HOUR FOR IMPLEMENTS USED ON 30-ACRE BLOCK OF WHEAT

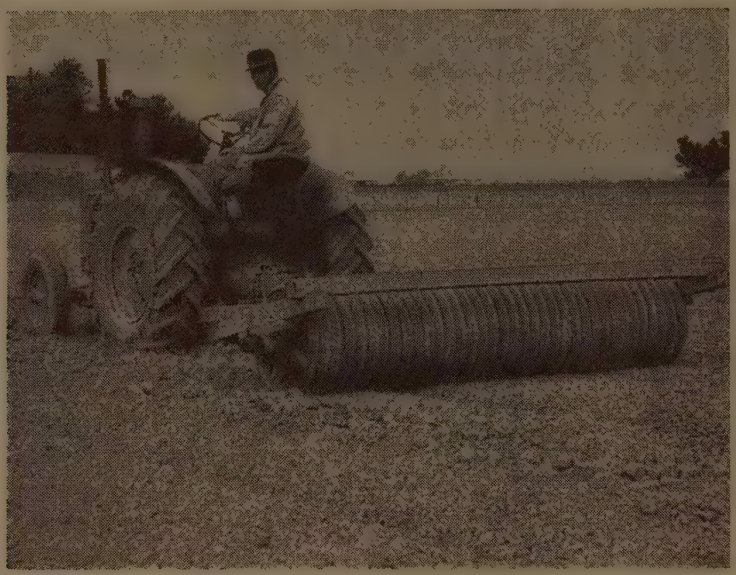
Cultivation practice and implement	Strokes	Speed in hours per acre	Total implement hours for 30 acres	Operating costs per hour	Total
				s.	£
Plough (skim; 3 furrow)	1	1.30	39.0	3.3	6.4
Plough (deep; 3 furrow)	1	1.40	42.0	3.3	6.9
Grubber (13 tine)	5	0.42	63.0	1.9	6.0
Harrow (5 leaf)	2	0.23	13.8	1.1	0.8
Drill (15 coulter)	1	0.48	14.4	9.9	7.1
Harrow (5 leaf)	1	0.23	6.9	1.1	0.4
Roller (9ft.)	1	0.35	10.5	2.8	1.5
		Totals	189.6		29.1

TABLE 7—IMPLEMENT OPERATING COSTS AS PERCENTAGE OF TOTAL COSTS

Implement	Fuel, oil, and grease	Repairs and replacements	Labour	Overhead costs	Total
Plough	Negligible	54.7	15.2	30.1	100
Grubber		36.1	10.4	53.5	100
Harrows		32.8	—	67.2	100
Roller		11.1	—	88.9	100
Drill		26.3	7.3	66.4	100
Trailer		4.7	14.6	80.7	100
Spray Equipment		19.9	13.8	66.3	100
Header harvester	8.5	23.3	3.7	64.5	100

The effect of operating speed and hours worked per year are two factors which must be considered when cost estimations of this nature are made. Slower than normal operating speeds mean more tractor and man hours, which will tend to drive costs up, and implements which are underused will have high hourly operating costs.

Most of the data under discussion originated from survey work done in Canterbury, where implements are



The roller usually does not do a great number of hours' work a year, but its tendency to high capital costs is offset by low repair and maintenance costs.

highly utilised, and therefore the hourly costs given may be somewhat low in relation to those for the rest of New Zealand.

Comparison with Contractors' Costs

It is interesting to compare the implement costs which have been calculated from survey work with the agricultural contract rates in Canterbury. In the construction of the survey figures shown in Table 9 it has been assumed that a medium/heavy wheeled tractor was used and the labour costs were calculated from current award rates.

Therefore it can be seen that with the highly used implements surveyed in Canterbury the estimated operating costs are quite close to contractors' rates, even though a contractor has to allow for his profit and transportation. This is a further pointer to the importance of capital costs and the need for sufficient utilisation to avoid high operating costs.

In the final analysis, therefore, it seems quite evident that the larger farms with a fair amount of cropping to be done must have their own range of implements, but the position may not be nearly so clear for the smaller farms and it could be that for some of their cultivation and harvesting operations contract work would be sounder economically. The one factor which cannot be properly evaluated, however, is the convenience of having equipment, particularly harvesting equipment on the farm and ready for use at the exact time it is required.

An important point to remember in the buying of new equipment is that overhead costs such as interest continue throughout the economic life of implements and tractors, and if they are used only for a relatively few hours per year, the operating costs per hour will tend to increase, possibly to a degree which will render such expenditure uneconomic.

TABLE 9—COMPARISON OF SURVEY COSTS WITH AGRICULTURAL CONTRACTORS' RATES IN CANTERBURY (Approximate Only)

Operation*	Survey costs per acre	Approximate contractors' rates
	s. d.	s. d. to s. d.
Plough (3 furrow)	20 0	18 0 to 25 0
Disc (8ft. tandem)	7 6	9 0 to 12 0
Grubber (13 tine)	6 0	8 0 to 11 0
Harrow (5 leaf)	3 0	5 0
Drill (15 coulter)	13 0	9 0 to 12 6
Roller (Cambridge) (9ft.)	5 6	6 0 to 9 0
Header harvester (6ft.; engine functioned)†	1 0 per bushel	1 0 per bushel

* Survey costs are based on implements of the sizes listed. Contractors' machines would probably be larger.
† For grain.

"Land, Water and Food": Herbert Addison

IN recent years there have been a number of books dealing with world food problems and though the word food appears in the title of the present volume, the book differs from most others treating this subject in that it deals with some of man's achievements in reclaiming land by controlling water and thereby increasing his food supplies. The author, who is an engineer, points out in the preface that he has endeavoured to modify the treatment of a technical subject so that it might interest the general reader. He has been successful in this and as an aid he has made good use of clear and simple diagrams.

He deals with Vermuyden's reclamation work in the English fenlands in the 1630s and with the more recent work in this area, and then takes the reader to the swamp drainage projects of Italy and Greece, to the great irrigation and control projects of the Nile River through Egypt and the Sudan, and to the recent work of converting Lake Victoria into a reservoir.

The chapters dealing with the works on the Nile are particularly interesting, the author having first-hand knowledge of this river. The magnitude of some of the Nile irrigation schemes is indicated in a description of the Gezira scheme in the Sudan under which a million acres are irrigated. In 1951 the plantations in this area yielded £54 million from the sale of cotton. Irrigation projects and the administrative and financial problems of schemes in North Africa, Israel, Jordan, Syria, Iraq, India, Australia, and the United States are also described.

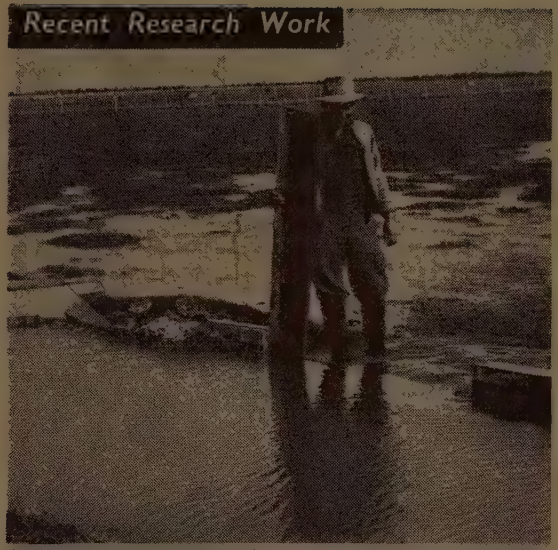
Some of the future difficulties facing the irrigation and drainage engineer in carrying out reclamation schemes are covered, and the author concludes that no one specialist can imagine that he holds the key to providing the increasing food supplies required for an expanding world population.

Altogether it is an interesting and readable story of some of man's successes in modifying his environment to yield more food. Students of agriculture will find the book worth studying, as will anyone who is interested in the problems of land reclamation by water control.

—*R.H.S.*

Chapman and Hall Ltd., London. 18s.

Recent Research Work



IRRIGATION IN CANTERBURY

WORK at the Department of Agriculture's Winchmore Irrigation Research Station is providing useful information on water requirements for irrigation for pasture and crop production on the light plains land of Mid-Canterbury.

IRRIGATION REQUIREMENTS

FROM a detailed study of weather conditions in all seasons in Mid-Canterbury since 1912 the following general information has been obtained: A certain amount of water is required each season from September to April so that a pasture may grow without being short of water at any time. For Mid-Canterbury conditions about 22in. of water are needed; that is, if 22in. of rain fell between September and April at the steady rate of about 1in. every 10 days, the pasture would never be short of water and irrigation would not be necessary. Though the total amount of rain received in an average season (about 20in.) is not far short of the requirement, it is so unevenly distributed that about 40 per cent. is normally lost as drainage. The difference between the "useful" rain and the amount of water needed is 10in; the seasonal deficit of water is therefore 10in. This deficit has to be made up by supplemental irrigation if a pasture is not to suffer from lack of water.

If the application of water could be carried out with 100 per cent. efficiency, and all the water that was applied was used by the growing plants, 10in. of water spread throughout the season would be enough, with the rainfall normally received. However, under most systems, the efficiency is much less than this, and in some cases from three to four times that amount of water has to be applied to correct the deficiency.

During the last season, 1955-56, drought conditions were experienced in Canterbury and many other parts of New Zealand. The deficit of water for the season in Mid-Canterbury was 13in.; that is, 13in. of irrigation water, in addition to the rainfall, were needed throughout the season to maintain ideal moisture conditions in the soil. January, in particular, was very dry and 4in. of the 13in. were needed in this month.

DRY SOILS

Several irrigating farmers have noticed during the past dry season that if the irrigation of a paddock is delayed until the soil has become fairly dry, the irrigation does not seem to be as effective as when it is done earlier, and in a comparatively short time the area needs to be irrigated again. In fact, it is frequently said that if an irrigation is left too late, two irrigations are required if the pasture is to recover fully. It is true, at least on the lighter soils of Canterbury, that moisture levels in the soil should be kept reasonably high if the pasture is not to be affected by lack of water, and that if the soil is allowed to dry out to any extent, several factors combine to have a detrimental effect on plant growth. As well as insufficient moisture in the soil to keep the plant transpiring healthily, a drought brings very high soil temperatures and a probable shortage of available nitrogen. High soil temperatures can have an influence on the recovery after irrigation of a badly wilted pasture.

SOIL TEMPERATURES

During January 1956 some soil temperature readings were taken which illustrate this point. On 25 January the air temperature reached a maximum of 86.2 degrees F., and readings of the temperature of the soil at various depths throughout the day gave the following results:—

	Irrigated area temperatures (degrees F.) at			Non-irrigated area temperatures (degrees F.) at		
Time	½in.	4in.	8in.	½in.	4in.	8in.
9 a.m. ..	68.7	65.5	66.4	79.7	68.7	70.7
11 a.m. ..	71.1	66.7	66.4	89.9	71.2	70.9
1 p.m. ..	79.0	68.5	67.0	108.0	76.0	72.3
3 p.m. ..	74.9	69.8	67.5	99.2	80.2	74.2

These figures show that at 1 p.m. (when the maximum soil temperature was recorded at the ½in. depth) the difference in temperature between the irrigated and non-irrigated soil near the surface was 29 degrees F. and that at ½in. depth the soil on the non-irrigated area was above 80 degrees F. for about 8 hours of the day. These very high temperatures must have a destructive effect on the delicate roots of pasture plants and delay their recovery when moisture again becomes available.

It also seems likely that when the soil is very dry the rate of nitrification—the rate at which organic nitrogen in the soil is converted into available inorganic forms—is very much reduced. Experiments at Winchmore have indicated that this rate is four times faster when the soil has a percentage moisture of 30 per cent. than it is when the percentage moisture is 5 per cent. This greatly reduced rate of nitrification results in a shortage of nitrogen to non-leguminous plants.

FIELD CAPACITY

However, allowing the soil to become very dry before applying the irrigation water has another important effect. The amount of water that a soil will hold after irrigation or heavy rain is known as the field capacity, and is about 30 per cent. for the topsoil of irrigated soil at Winchmore. Allowing the soil to become very dry before irrigation results in a lowering of the capacity of the soil to hold water. For instance, on an area which had a field capacity of 30 per cent. during winter and early spring the field capacity dropped to 25 per cent. after the soil was allowed to dry out to a moisture percentage of 9 to 10. After a dry season the field capacities of various irrigation treatments reflect their previous moisture conditions. (These treatments are all on the same soil type, have been given the same topdressing, and are stocked according to their production.)

Treatment	Field capacity per cent.
Non-irrigated ..	22.2
Adequate water	30.1
Restricted water ..	27.5
Irrigated every 3 weeks ..	27.1

If allowing the soil to become too dry affects its capacity to hold water, it is likely that the next irrigation will be required in a shorter time than it would otherwise have been. Thus, two irrigations may be required to bring the field capacity back to normal.

—D. S. RICKARD

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A New Carrot Variety for the Home Gardener

NEW varieties of vegetables are developed in two main ways. The first is by controlled hybridisation of two separate varieties with the aim of combining the advantageous characters of both into one new variety. The second is by straight selection of a different type out of an already existing variety. In the latter method plants differing slightly in agronomic characters are selected for the production of seed, and this process is carried on until a race of plants sufficiently different from the parent variety is ultimately produced and usually given a new name. Many of the vegetable varieties listed in seed catalogues throughout the world have arisen through this means. This article by G. Priestley, Vegetable Section, Crop Research Division, Department of Scientific and Industrial Research, describes the Department's development of a garden variety of carrot now given the name of Sweetcrop by this method of selection of a different type out of an existing variety.

THIS garden variety has been developed by straight selection from the field variety of carrot Holmes Improved. The latter variety was developed in north Taranaki about 45 years ago and is now grown as a field carrot in that and other districts. It is a large, long, pale-fleshed carrot, inclined to grow out of the ground, so that the top becomes green. The core, which is large and pale, is crisp and fibreless, and the flavour is generally sweet.

From 1938 to 1949 the Agronomy Division at Lincoln (now the Crop Research Division) was responsible for maintaining stock seed of the field type of Holmes Improved by seed production from selected roots. During this time a certain amount of improvement was made in the shape, colour, and smoothness of the outside skin. It was during these years also that the potential value of this carrot as a table variety was realised. The sweet flavour and crisp, fibreless texture made this carrot better than most varieties for cooking and salads, but its large size, length, and pale colour, with a tendency to have green shoulders, made it unattractive in appearance for marketing and for table.

It was decided therefore to develop a type more suitable for the home gardener—a smaller, stump-rooted type of carrot of a deeper colour that would be more acceptable in appearance to the consumer and yet retain the sweet flavour and cooking qualities of the original.

As a result of this selection work a strain of seed has been produced which gives carrots about 6in. long, about 2in. to 3in. across the shoulders, and stump-rooted. The roots are still paler than most varieties of carrots, but are definitely of a deeper colour than the original field carrot. The original Holmes Improved and the shorter selection Sweetcrop are compared in the illustration.

Suitability for Home Garden

This strain has already been tested by many home gardeners throughout the Dominion, and under all conditions it has been found to be high yielding and evidently resistant to aphids. Many home gardeners in some areas have found that they have procured good crops of carrots by growing this strain, whereas other varieties have repeatedly failed with attacks of aphids. The variety has not yet been tested sufficiently to prove its suitability for commercial production.

Yield

In the production of a crop of carrots a high yield of main-crop roots is usually the most important aim. In certain seasons, however, the yield of early roots which can be pulled early in the season is also important.

To test this strain selected at Lincoln as an early pulling as well as a main-crop carrot trials were carried out at Lincoln in 1951-52 and at Otahuhu and Lincoln in 1953-54. The strain was compared with Chantenay Red Core and Manchester Table in trials designed to test the early and main-crop yields of these varieties. A replicated trial was laid down and a standard number of roots was pulled and weighed at regular intervals throughout the season. In both the trials carried out at Lincoln the selected strain gave a significantly greater yield of early and main-crop roots at each date of pulling, showing that this strain can be used equally well as an early pulling carrot as well as a main-crop variety.

Quality and Flavour

In any vegetable grown for table use quality and flavour are of the utmost importance, but the plant breeder finds these are difficult to assess with any accuracy. Individual tastes differ, and quality may be influenced to a certain extent by environmental conditions.

To obtain more specific information on the flavour of the Lincoln selection the co-operation of a number of housewives was obtained in 1953 in carrying out cooking tests. Samples of freshly dug, mature roots were supplied to 30 families in Christchurch with a questionnaire on the flavour, texture, cooking qualities, appearance, and

The long type of Holmes Improved (two roots on the left) compared with the shorter selection Sweetcrop (three roots on the right). The root on the extreme left is a little over 11in. long.

size. The housewives were asked to compare these points of the carrots with those of other varieties they had cooked.

The housewives concerned in this test were unknown to the staff of the Crop Research Division and they returned frank and comprehensive reports. On the question of texture and flavour of this strain 73 per cent. considered it to have a better and sweeter flavour than other varieties of carrots and a finer texture for cooking. The remaining 27 per cent. considered it to be as good as other varieties. All returned a favourable report on the appearance of the roots and 87 per cent. considered that the slightly paler colour was not a disadvantage and would not deter them from purchasing the variety in a shop.

Method of Selection and Seed Production

The method of selection and seed production of carrots followed at Lincoln is as follows:—

The seed for the crop from which selections are to be made is sown in October. The seed is sown in rows 18in. apart and the young seedlings are severely thinned in the rows to stand about 3in. to 4in. apart. For selection work full development of each root is required so that the shape and size of each root can be properly judged on lifting. Good selection cannot be carried out on roots which have been reduced in size through crowding. The crop of carrots is lifted in April or May and roots conforming to the required type are selected from the crop. In the development of the strain Sweetcrop roots 6in. long, stump-rooted, square-shouldered, and about 3in. across the shoulders were selected.

The selected roots are immediately replanted into the soil in an isolated area for seed production, the tops being shortened back to about 2in. and the roots planted so that the crowns are just level with the soil surface. The roots are planted 1ft. apart in the rows. To protect the crown from frost and excess moisture during winter a small pile of old sawdust is put round and over each crown. This has been found to prevent a loss of roots. In most countries the usual practice is to store or pit the selected roots during winter and to transplant them into the open ground in spring, but this is not necessary in New Zealand, where winters are comparatively mild.

Good, strong flowering stems are produced in spring and summer from each selected root and the seed is harvested in February. It is usual at Lincoln to keep separately the seed harvested from each plant and to sow out each lot of seed the following year as a separate line. When the crop matures these separate lines are lifted and judged individually, and further roots are selected out of the best lines for more seed production. This process may be carried on for several generations until the majority of the plants are coming true to type.

During development of this strain home gardeners have been receiving small quantities of seed for trial purposes from the Crop Research Division. Owing to the increasing demand for seed it was decided to release this selection, now named Sweetcrop, to the seed trade for multiplication and distribution.

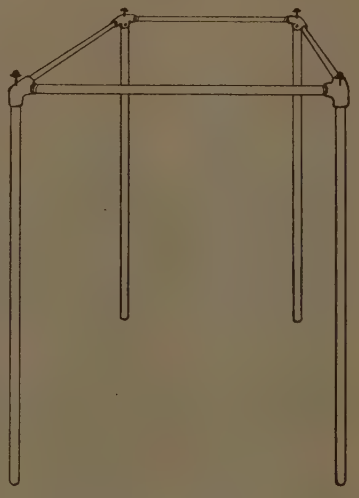
Easily Made Fadge Frames or Holders for Wool Oddments

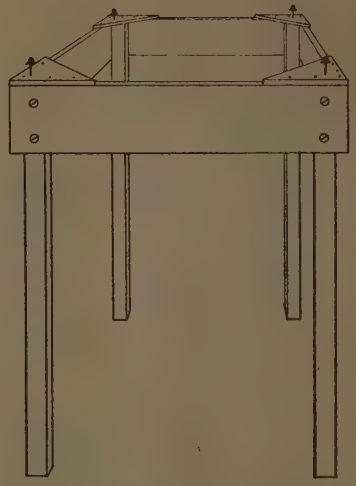
THE illustrations at right show two versions of a very handy device for holding and supporting wool packs in the open position so that they can readily be filled with wool. Many types of frames, brackets, and arrangements of wire, twine, staples, and nails have been used in the past for this purpose. All these have supported the pack from the outside; the novelty of the type illustrated is that it supports the pack from the inside.

The frame is placed inside the pack to hold it open, and the flaps of the pack are held at each corner by being skewered with lead-headed nails, which fit into the holes provided in the corners of the frame. The **outside** dimensions of the frame must therefore be fairly close to 27in. square and 39in. high over all.

The result is a very neat package which takes up a minimum of room, and often fadges on these frames can be placed on the shearing board, where an orthodox type of frame would take up too much room. They can readily be moved, and once the fadge is full the frame can be pulled out very easily and used again for the next pack.

The original wooden version, which was evolved by R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings, weighs about 23lb. and can be made by any handyman. All timber must be smoothly dressed to prevent wool adhering.



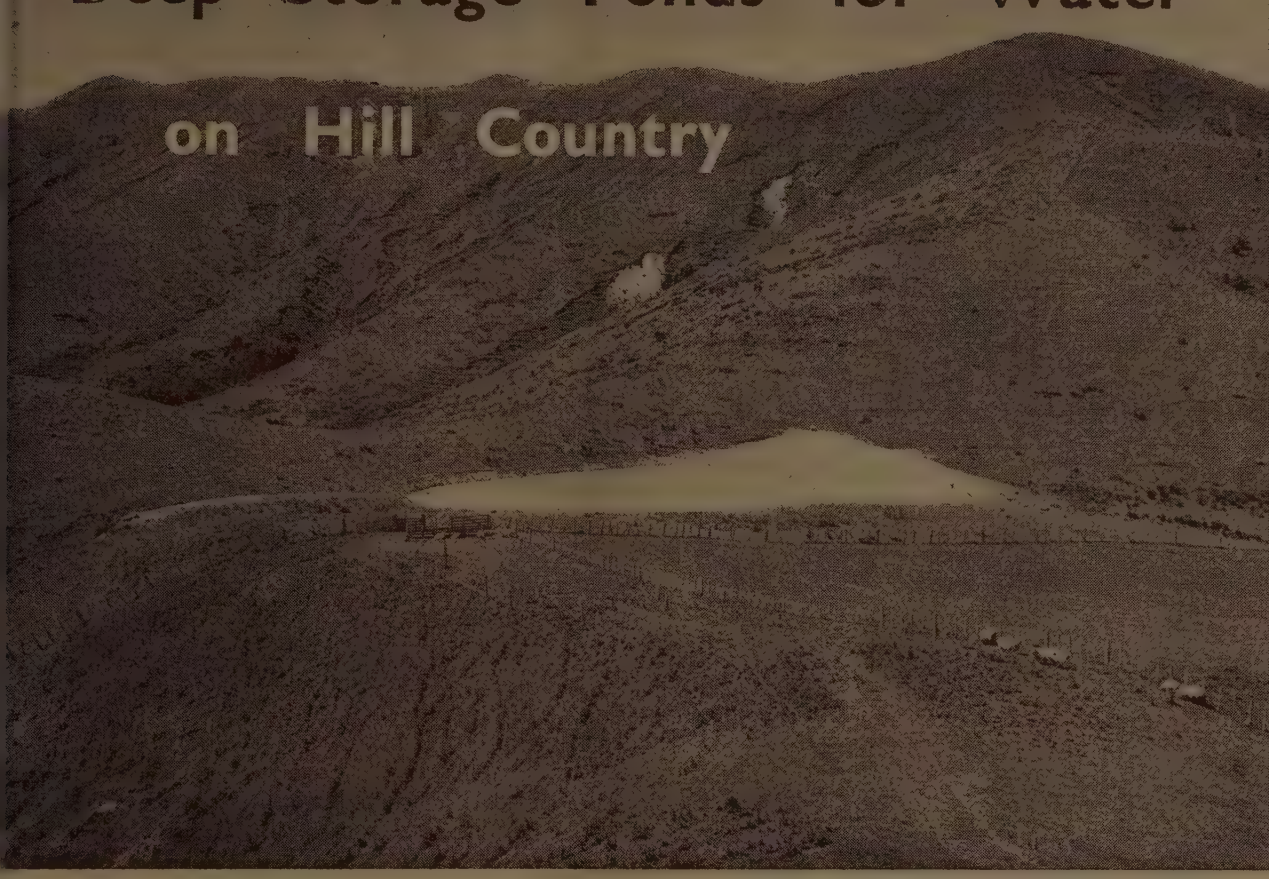


The steel version, made from ½in. galvanised-steel pipe, is used by the writer for field days and demonstrations. It is lighter and stronger than the wooden one, and the type illustrated is collapsible, the corners being held together by scaffold-type fittings; each pipe is quickly locked in place by a small screw.

Alternatively standard screwed water pipe fittings could be used, or for a permanent job the pipes could be welded together at the corners either with or without the use of elbows.

—*J. E. DUNCAN,*
Wool Supervisor,
Department of Agriculture,
Wellington

Deep Storage Ponds for Water on Hill Country



By F. G. SPITE,

Instructor in Agriculture, Department of Agriculture, Masterton

SINCE the first of a new type of deep water-storage ponds was constructed by bulldozer on Wairarapa hill country several years ago the outstanding success of these ponds in providing clean, permanent water for stock where it was most needed has resulted in many thousands of such ponds being constructed in recent years throughout the Wairarapa and in parts of Southern Hawke's Bay. These ponds have done much to solve the problem of water supplies, especially for new subdivisions, and they have proved much superior to the old type of earth dam or ponds in shallow depressions in providing adequate water through recent hot, dry summers. Few of these ponds have failed and then only where the subsoil in which they were constructed proved to be too porous or where much of the water was lost by seepage through a built-up bank.

THOUGH much hill cuntry in the higher-rainfall areas is well watered by permanent streams, there are many districts where streams dry up in summer, and dams, generally built in gullies, have had to be relied on for stock water. Many of these dams have been quite successful, but many have failed to supply water in really dry summers and many others have suffered from washouts as a result of heavy rainstorms or became silted up in time with material washed down the gully.

The deep ponds, the construction of which has been made possible by the use of heavy earth-moving equipment both for track making to get over the country and for the ponds themselves, are designed and sited to reduce water loss by seepage and by evaporation to a minimum and also to eliminate the danger of washouts and the loss of water-holding capacity through silting up. The ponds provide much cleaner water than that from the old-type dam or shallow pond in a depression and they can be located on or near ridges for easy access by stock, because the catchment required to supply them is relatively small and not necessarily steep.

There are still many hill country districts and farms where the use of this type of deep-water storage pond would cheaply and effectively solve the problem of adequate water supplies in the driest summers, providing the few essential features of siting, construction, and capacity discussed later are seen to.

Siting of Ponds

The pond, because of the prevention of loss of water by seepage and

evaporation, do not require a big catchment. Except in very dry districts (under 30in. of rain annually) 4 to 5 acres or even less is sufficient. The catchment needed in relation to the rainfall and capacity of the pond can be worked out as indicated later.

The site should provide for a satisfactory catchment on or near a ridge for easy access and can be anywhere in the hills to suit subdivision or to encourage stock to keep to the higher parts of the country. Though some of the depth is made up by the earth removed in excavation of the pond, the bulk of the depth of up to 15ft. is in the subsoil and a knowledge of what sort of material lies at this depth in the country on which ponds are contemplated is very helpful in selecting sites.

The greatest loss of water from the old-type earth dam is by seepage through the earth wall, and from shallow ponds through both seepage through the bottom and evaporation from the surface. The more impervious the deep subsoil is the less trouble there will be from seepage, though this can be reduced or eliminated where the subsoil is pervious by lining the pond with puddled clay as it fills with water.

Construction of Ponds

The ponds depend on depth for the reduction of evaporation, as the deeper layers of water remain cool even in the hottest and driest weather.

Excavation is best done with a heavy bulldozer. Many contractors use two machines working from the centre out to the rim, making a round or oval pond with the necessary depth at the centre and a rim of earth built up round the edge. Care must be taken in this case to provide access for the water from the catchment. The best ponds, however, are those where the earth is shifted to the end away from the overflow outlet, which is at the deep end, and the earth at the other end is not depended on to any extent for water-holding. Excessive seepage is thus not likely. The pond is scooped out from one end to the other with quite steep sides of one-in-one slope or less and with the shallow end toward the excavated material. The bottom should be impervious to water or made so.

The illustration at the head of this article shows a well-constructed pond in a good site. It is capable of supplying four paddocks from a relatively small catchment.

Capacity of Ponds

Studies of drinking water intake by farm animals conducted at Massey Agricultural College have indicated a wide variation depending mainly on temperatures and the moisture content of grass. These data indicate that an average daily allowance of 2 gallons per grown sheep and up to 8 gallons per day for mature cattle through summer are adequate. The capacity required to supply stock water for a 100 days' dry period for a 100-acre paddock carrying 2 ewes per acre and 20 mature cattle could therefore be worked out as follows:—

	Gallons
200 ewes at 2 gallons per day	400
20 cattle at 8 gallons per day	160
Required daily	560
Required for 100 days ..	56,000

To allow for losses by evaporation and seepage the capacity could well be doubled and a pond holding 100,000 to 120,000 gallons should supply adequate clean water for the stock carried on the 100 acres. As there are approximately 6¼ gallons to 1 cub. ft. of water, a pond 30ft. wide at the top, 10ft. at the bottom, and averaging 10ft deep would have to be 90ft. long to hold 112,500 gallons of water. The average cross-section (in this case 200 sq. ft. multiplied by 6.25 = 1250) gives the gallons of water per foot of length of the pond.

The catchment necessary to feed a pond of a desired capacity can be checked roughly by estimating the run-off for winter, when the land is saturated and most of the rain that falls will run into the pond. If the average rainfall for June, July, and August, when there is little evaporation and the ground is usually saturated, is, say, 12in., about 270,000 gallons will have fallen on each acre (43,560 cub. ft. multiplied by 6.25). If only half of this amount finds its way into the pond, an acre catchment will be ample for the pond required for a 100 acre paddock carrying the stock cited in the example.

Sometimes in the Wairarapa in dry seasons and low rainfall areas it has taken two winters for the ponds to fill from the small catchments supplying them, but such ponds when once filled have not gone dry despite two or more summers much drier than average.

Utilisation of Water

Though ponds of the type described are often left open to give stock free access to the water, this generally results in much pugging of the sides of the pond in dry weather and pollution of the water. It is much better to fence the pond and a small surrounding area and to siphon off the water to troughs into the paddocks as required. For this purpose plastic piping is excellent. With a float fastened about 2ft. from the end of the pipe, which is weighted to keep it under the water at the intake, water can be siphoned to troughs anywhere some feet below the height of the pond when the usual ballcock is used at the troughs. With a well-grassed catchment and provided the water can enter the pond without having to pass over freshly excavated soil the water in these ponds can be quite clean and free from silt.

Many homesteads use water from one of these ponds for domestic purposes other than for drinking and preparation of food and also for gardens. Where this is done the small catchment is fenced off and planted in suitable evergreen trees, though these should not be too close to the pond area.

Advantages

Deep, narrow ponds made possible by the use of heavy earth-moving equipment have provided a much better and more certain water supply for hill country than streams, dams in gullies, or shallow ponds. They can be located where water is most required and if they are made with sides and bottom impervious to water and are deep and narrow to reduce evaporation, they are unlikely to fail even in the driest summer. The catchment need not be big or steep and by keeping a good cover of grass on it and a clear run-off into the pond from the catchment the water will be clean and there will be little or no silting.

Composting of Refuse by Local Bodies Not Very Profitable Yet

LARGE-SCALE production of compost from organic material collected as refuse by local bodies has not proved very profitable yet, according to information assembled by the Inter-Departmental Committee on Utilisation of Organic Wastes in its third interim report. The report says, however, that though there may be no profit in composting, the cost of municipal refuse disposal may be reduced. "The economics of composting cannot be assessed in pounds, shillings, and pence alone without consideration of the ultimate benefit to the community resulting from conservation of what would otherwise be a wasted material," adds the report.

The report says cost of production of compost on a commercial scale must be reduced. Commercial growers are likely to examine critically the cost in comparison with that of other forms of organic manure.

Copies of the report on utilisation of organic wastes are available from the Government Printer, Wellington, at 4s. each.

1956 Pig Carcass Competitions

Quality and Profit in Pig Production

THE 1956 series of pig carcass competitions has been notable in bringing to light some teams of outstanding quality which have set new records both in the section of the competition in which growth-rate and carcass quality are taken into account and in the purely quality competition. This year's competitions are reviewed in this article by A. Longwill, Superintendent, Pig Industry, Department of Agriculture, Wellington, who uses the facts revealed in the results to argue the case for restricting the competition to teams for which farm data are available.

THE pig carcass competitions sponsored by Messrs. W. and R. Fletcher (N.Z.) Limited, conducted in the North Island and finalised in the usual well-organised field days in the Tomoana, Patea, and Westfield freezing works, have brought out some interesting lessons for those prepared to study the results. The points system used in the competition has been unchanged for a number of years and judging has been carried out by a panel working together consistently. Points are allocated as shown in Table 1.

TABLE 1—POINTS SYSTEM USED IN COMPETITIONS

	Maximum points Porkers	Baconers
Measurement		
Body length	20	20
Backfat: Shoulder	10	10
Loin	15	20
Balance of side	5	5
Eye appraisal		
Hams	15	15
Shoulders	10	10
Development of loin	10	10
Belly thickness	5	5
Marketing points	10	5
Total carcass points	100	100
Team points		
Evenness of weight	10	10
Conformation	10	10
4 carcasses (max.)	400	400
Carcass-quality max. per team	420	420
Growth-rate points per team	100	100
Max. for growth-rate section	520	520

Quality Maintained

The general standard is practically unchanged and no significant improvement can be expected until results of pig-improvement work still in its embryo stages become effective and the incentive to the production of quality carcasses is applied through the market.

The judges in the 1956 championship at Westfield freezing works. From left: Messrs. T. Marks, F. Merritt, J. D. Anderson, J. J. Rich, F. W. Early, and G. Payne.

Keen Management

A relatively small group of competitors who have been interested in the competition for several years have consistently maintained a high place and steadily advanced the top performance (see Table 2).

They recognise that though the right type of foundation stock is essential to success, a specialised type of management plays a very large part in determining the final placings. When the art of feeding has been mastered there is still the risk of bruising in transit to works, which has often proved the wrecker of high hopes.

Competitors who are in a position to transport their own pigs direct from farm to works undoubtedly have some advantage in this respect. This is especially important with porkers, where the maximum of 10 points per pig (40 per team) for marketing points allows considerable changes in relative positions of teams to take place compared with how they would score if judged on what might be termed farm points—those influenced by the inheritance of the pigs and their treatment up to the time they leave the farm.

In competitions of the type and size of those being discussed there appears to be no possibility of removing this anomaly. Judges might, however, give consideration to a revision of the interpretation of marketing points as far as new bruises and scratches and hoof and teeth marks are concerned while still penalising pigmentation, "seedy cut", skin disease, second-growth hair, old bruises, or otherwise unattractive skin as hitherto.

There is scope for better handling of pigs from the farm pen to the sticking pen and responsibility rests on all involved in production, transport, and processing.

Profitable Pigs

The growth-rate section has demonstrated that over the past 2 to 3 years strains of pigs capable of producing high-quality carcasses in better-than-average time can be identified. This should be the real test of merit and means should

TABLE 2—POINTS SCORED BY CHAMPION TEAMS

	Carcass-quality section			Growth-rate section	
	Porkers	Baconers	Combined	Porkers	Baconers
1951	342	347	680	409	405
1952	343	348	678	441	429
1953	350	349	674	447	398
1954	353	353	686	433	442
1955	352	367	696	443	435
1956	373	361	730	463	454

TABLE 3—ANALYSIS OF RESULTS IN GROWTH-RATE SECTION

	Porkers	Baconers	Total	Total teams in competitions
Tomoana	51	24	75	189
Patea	5	3	8	240
Westfield	33	18	51	608
Totals	89	45	134	1,037
No. of teams reaching "merit" standard	58	25	83	
Percentage of teams entered in section reaching this standard	65	56	62	

be found to organise the competition so that farm data, checked on some satisfactory basis, are available for all teams in the competition.

This year's competition provides confirmation of two points which have been made in earlier reviews:—

The top porker teams are usually also teams which have grown up to the standard set for growth-rate.

Though in baconers the combination of growth-rate and carcass quality is not obtained so readily, some strains are able under efficient management to combine the two very effectively. This in itself emphasises that the growth-rate section provides a critical test for baconer production which can be really worth while in helping to make some preliminary selection of efficient baconer-producing strains.

In this year's growth-rate section there were 134 entries, which is a record for teams in this section (see Table 3), though it could be still better supported.

Results of Selection

Though keen competitors have shown consistent performance and steady improvement as a result of their breeding, care, and management (as evidenced this year by Mr. W. G. Bell's outstanding carcass scores of

TABLE 4—TEAMS SCORING 70 PER CENT. OR MORE OF TOTAL POINTS IN GROWTH-RATE SECTION

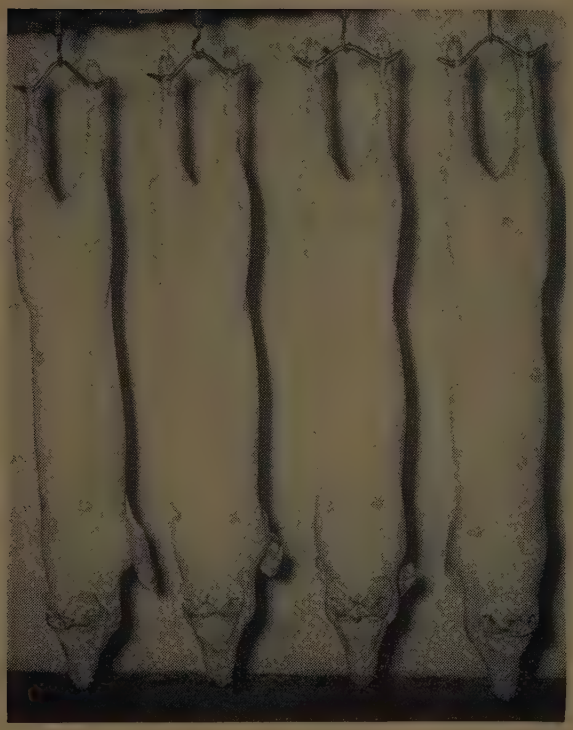
The details below are given in the following order: Exhibitor; breeding of pigs; age (in days) at slaughter; average deadweight (in pounds) of 4 pigs; carcass points; total points; total points as percentage of possible points (520).

PORKERS (58 teams)

V. D. Griffen, Hexton, Gisborne; L.W. x (L.W. x B.); 12/1/56; 125; 83; 365; 463; 89.2
W. G. Bell, Ardmore; ped. L.W.; 21/12/55; 128; 79; 373; 456; 87.7
J. Dobbs, Tolaga Bay; L.W.; 25/1/56; 119; 83½; 351; 451; 86.7
N. Alexander, Nuhaka; T. x B.; 28/12/55; 112; 70⅜; 340; 438; 84.2
T. R. Colebrook, Manutuke; L.W. x B.; 15/11/55; 120; 82½; 337; 435; 83.5
Hawke's Bay Hospital Board, Napier; L.W. x B.; 15/12/55; 112; 86; 334; 434; 83.4
B. M. Sewell, Patutahi; L.W. x (T. x B.); 23/11/55; 112; 77⅜; 333; 433; 83.3
S. J. Hooper, Muriwai, Gisborne; L.W. x B.; 26/10/55; 119; 78; 334; 432; 83.1
T. W. Sewell, Patutahi; L.W. x B.; 16/11/55; 105; 76¾; 331; 431; 82.9
C. Schwass, Muriwai, Gisborne; L.W. x B.; 6/12/55; 121; 77; 337; 430; 82.7
J. G. Johnston, Patumahoe; B. x L.W.; 3/2/56; 117; 72½; 336; 427; 82.1
H. A. and A. D. Aitken, Waverley; L.W. x B.; 17/2/56; 117; 69¼; 341; 426; 81.9
R. W. Hamilton, Patutahi; L.W. x B.; 19/2/56; 115; 85⅜; 326; 426; 81.9
M. E. Wright, Kumeu; L.W. x B.; 20/12/55; 120; 79; 328; 425; 81.7
V. D. Griffen, Hexton, Gisborne; L.W. x B.; 27/1/56; 124; 84; 319; 419; 80.6
Fowell Bros., Howick; B. x L.W.; 15/2/56; 121; 72½; 336; 418; 80.4
J. F. Bremner, Pahiatua; L.W.; 11/1/56; 125; 77¼; 330; 417; 80.2
J. and P. Bennett, Howick; L.W. x (B. x L.W.); 25/11/55; 112; 82½; 315; 415; 80.0
Fowell Bros., Howick; B. x L.W.; 14/11/55; 135; 77⅜; 342; 407; 78.3
T. R. Colebrook, Manutuke; L.W.; 15/1/56; 122; 74½; 322; 406; 78.1
R. McNee, c/o Sewell, Patutahi; L.W. x (B. x T.); 13/11/55; 122; 74½; 321; 405; 78.0
Willis Bros., Gisborne; L.W. x B.; 8/11/55; 120; 81; 306; 404; 77.7
Mrs. S. E. Edwards, Dannevirke; L.W. x B.; 2/12/55; 124; 74½; 322; 404; 77.7
R. C. McGrannachan, Patutahi; L.W.; 10/9/55; 117; 72; 311; 403; 77.5
K. Edwards, Ruaroa, Dannevirke; L.W. x (T. x B.); 20/12/55; 120; 87; 303; 403; 77.5
L. F. Eustace, Hawera; L.W.; 11/11/55; 116; 79¼; 302; 402; 77.3
K. Edwards, Ruaroa, Dannevirke; L.W. x (T. x B.); 12/12/55; 100; 72½; 300; 400; 76.9
D. Mills, Makauri, Gisborne; L.W. x (B. x L.W.); 27/1/56; 138; 81; 332; 400; 76.9
J. Todd, Cambridge; B. x L.W.; 29/11/55; 133; 75; 337; 399; 76.8
K. Sewell, Patutahi; L.W. x (T. x B.); 9/11/55; 126; 73; 324; 398; 76.6
T. W. Sewell, Patutahi; T. x B.; 16/11/55; 105; 87½; 297; 397; 76.4
H. and N. Myers, Mauriceville; L.W.; 24/1/56; 121; 72¾; 310; 395; 76.0
G. Edwards, Ruaroa, Dannevirke; L.W. x (T. x B.); 28/11/55; 107; 73¾; 295; 395; 76.0
B. Bolstad, Pahiatua; L.W.; 21/1/56; 129; 94; 298; 394; 75.8
E. Bolstad, Pahiatua; L.W.; 1/1/56; 142; 90; 313; 394; 75.8
Mrs. M. E. Bent, Otorohanga; L.W. x (Duroc x B.); 23/12/55; 111; 68; 298; 392; 75.4
Mrs. S. E. Edwards, Dannevirke; L.W. x B.; 5/12/55; 121; 71½; 311; 392; 75.4
I. Billington, Eketahuna; L.W. x T.; 11/1/56; 111; 99¾; 290; 390; 75.0
R. Corvell, Galatea; L.W. x (B. x L.W.); 29/11/55; 150; 90½ 322; 387; 74.4
N. A. Fraser, jun., Kawakawa; L.W.; 8/11/55; 149; 86½; 328; 386; 74.2
F. A. Buckley, Manutuke; T. x B.; 24/10/55; 149; 81½; 340; 385; 74.0
G. Edwards, Ruaroa, Dannevirke; L.W. x (T. x B.); 28/11/55; 121; 70½; 305; 384; 73.8
Waldrom Bros., Waipawa; T. x B.; 7/11/55; 126; 97½; 281; 381; 73.3
J. G. Black, Whakatane; L.W. x B.; 10/12/55; 151; 80⅛ 344; 381; 73.3
H. and N. Myers, Mauriceville; L.W.; 6/12/55; 128; 77¾; 296; 379; 72.9
J. Gilliland, Hopelands; L.W. x L.B.; 20/9/55; 128; 83; 284; 377; 72.5
A. E. Wood, Whakatane; L.W.; 23/9/55; 146; 79½; 333; 376; 72.3
Mrs. M. A. Edwards, Whangarei; L.W.; 21/10/55; 119; 66½; 304; 375; 72.1
H. J. Billington, Eketahuna; L.W. x T.; 13/1/56; 97; 96¾; 274; 374; 71.9
S. J. Hooper, Muriwai, Gisborne; L.W. x B.; 23/10/55; 143; 75; 332; 374; 71.9
J. F. Bremner, Pahiatua; L.W.; 11/11/55; 130; 75¾; 303; 373; 71.7
C. E. Sage, Massey, Henderson; L.W.; 8/12/55; 124; 67; 311; 372; 71.5
H. E. Johnson and Co., Whangarei; L.W.; 17/9/55; 154; 84; 330; 370; 71.2
F. R. Holt, Te Kauwhata; L.W. x B.; 27/11/55; 121; 69⅜; 294; 368; 70.8
R. J. Bent, Otorohanga; L.W. x (Duroc x B.); 31/10/55; 108; 70½; 268; 367; 70.6
R. K. Robb, Woodville; B. x L.W.; 5/10/55; 148; 79½; 323; 366; 70.4
R. J. Johnston, Runciman; T.; 22/11/55; 136; 71½; 318; 364; 70.0
P. D. Darby, Bombay; L.W. x B.; 9/12/55; 145; 71½; 339; 364; 70.0

BACONERS (25 teams)

S. J. Hooper, Gisborne; L.W. x B.; 2/8/55; 183; 142½; 357; 454; 87.3
S. J. Hooper, Gisborne; L.W. x B.; 18/7/55; 191; 150⅜; 351; 451; 86.7
L. F. Eustace, Hawera; L.W.; 10/11/55; 168; 142⅜; 340; 440; 84.6
W. G. Bell, Ardmore; ped. L.W.; 15/10/55; 195; 140½; 357; 436; 83.8
H. E. Johnson and Co., Whangarei; ped L.W.; 29/5/55; 187; 145⅛; 339; 436; 83.8
Fowell Bros., Howick; ped. L.W.; 20/12/55; 178; 137; 333; 432; 83.1
R. C. McGrannachan, Patutahi; L.W.; 15/5/55; 192; 150¾; 332; 427; 82.1
H. A. and A. D. Aitken, Waverley; L.W. x B.; 6/9/55; 203; 130⅜; 356; 423; 81.3
K. Edwards, Ruaroa, Dannevirke; L.W. x (T. x B.); 1/7/55; 189; 147⅜; 314; 412; 79.2
Waldrom Bros., Waipawa; T. x B.; 2/9/55; 192; 140½; 327; 412; 79.2
R. C. McGrannachan, Patutahi; L.W.; 20/9/55; 198; 133; 343; 408; 78.4
W. D. Hope, Te Puke; L.W. x B.; 15/11/55; 191; 136; 329; 407; 78.2
J. F. Bremner, Pahiatua; L.W.; 22/10/55; 178; 132⅜; 312; 406; 78.0
P. D. Darby, Bombay; L.W. x B.; 5/7/55; 226; 155⅛; 347; 402; 77.3
G. Edwards, Ruaroa, Dannevirke; L.W. x B.; 1/7/55; 202; 149⅜; 315; 399; 76.7
N. A. Fraser, jun., Kawakawa; L.W.; 2/5/55; 220; 143½; 348; 394; 75.8
Fowell Bros., Howick; L.W.; 12/11/55; 201; 135⅜; 330; 393; 75.6
T. W. Sewell, Patutahi; T. x B.; 25/8/55; 224; 140; 351; 389; 74.8
H. A. and A. D. Aitken, Waverley; L.W. x B.; 22/8/55; 210; 145; 319; 384; 73.8
Mrs. S. E. Edwards, Ruaroa, Dannevirke; L.W. x B.; 1/7/55; 209; 151½; 304; 380; 73.0
B. M. Sewell, Patutahi; L.W. x (T. x B.); 18/9/55; 234; 142½; 349; 375; 72.1
J. and P. Bennett, Howick; L.W. x B.; 25/8/55; 196; 147½; 286; 374; 71.9
J. W. Risi, Ngaruawahia; T. x L.W.; 28/8/55; 229; 148; 333; 374; 71.9
K. Edwards, Ruaroa, Dannevirke; L.W. x (T. x B.); 1/7/55; 195; 150; 277; 371; 71.3
C. H. Webby, Opotiki; L.W. x B.; 11/9/55; 192; 133½; 298; 371; 71.3



Lot No. 241
Porkers

Tomoana Porker & Baconer Competition

Competitor's Name: BELL W.G.
Address: ARDMORE, PAPAKURA
Breed of Pigs: PED. L.W.
Carcase Weights: 80 77 & 75
Feeding Particulars: SKIM & GRASS
TOMOANA PRODUCTS

	Maximum Points (4 Pigs)	Points Awarded
Evenness of Team Weight	10	10
Length	80	78
Balance & Depth of Side	20	20
Loin Fat	60	50
Shoulder Fat	40	38
Thickness at Belly	20	20
Hams	50	47
Fore-end	40	32
Development of Loin	40	32
Marketing Points	40	37
Conformation	10	9
	Maximum Possible 420	373
Deductions for Unsuitability of weight	Maximum Deductions 60	—
		Total Points 373
	Plus Growth Rate	23
PLACE		156

J. Marks
J. D. Anderson
Judges

The outstanding porker team, which scored almost a 90 per cent. average for carcass quality, and a facsimile of the points score card.

373 in porkers and 730 in combined teams, which set new records by a comfortable margin), the results of selection are best evidenced by the results of a team from the National Hybrid foundation (see Table 4). The leading team in the porker growth-rate section was entered by a newcomer to the competition and one who did not claim any high degree of skill in his management. Mr. V. D. Griffen entered his first litter from the National Hybrid sow he received, in-pig to a pedigree Large White boar, after she had successfully passed the performance test in her first litter at Massey Agricultural College.

The sow farrowed in temporary accommodation and, while rearing the litter, had access to a 5-acre clover pasture. After weaning, the litter was reared in an ordinary 8ft. x 8ft. house in a small (1 chain by ½ chain) grass run. Skimmed milk was supplemented with a little maize and barley meal and in the later stages of growth with some fodder beet. Thus the team was very economically fattened under quite ordinary farm conditions and, though climatic conditions favoured outside rearing, the performance was excellent, giving some indication of the capacity of the stock selected for the National Hybrid foundation. The Large White sire of the litter must be credited with a share of the merit of this performance.

Another litter from a National Hybrid sow provided the entry with which Mr. L. F. Eustace took third place in the baconer growth-rate section. This litter grew extremely well and though Mr. Eustace is a whey feeder, the pigs killed out at 142½lb. in 168 days, or 15 days less than the standard age for this weight. This rate of growth and a carcass score of 340 are a highly creditable combination.

Economic Significance of Growth-rate

This year's growth-rate section provides striking evidence of the economic significance of growth-rate in both porkers and baconers. High carcass scores unless accompanied by evidence of profitable growth are of relatively little interest or real merit. The data accumulated in this competition, however, enable some estimate of the financial loss involved in slow-growing pigs.

Several teams in the baconer growth-rate section scored the possible for growth, including some at the head of the list on quality also, but two teams in the section, though scoring over 350 points for carcass, failed to score any points for growth. In fact they were 102 and 76 days older respectively than standard for the average weight of the team. If on a rough estimate an efficient pig returns 1s. per day, the loss on each pig in these teams, compared with standard, can be calculated as follows:—

Age	Carcass weight	Days older than standard	Estimated loss per pig compared with standard
days	lb.		£ s. d.
289	146¼	102	5 2 0
258	141	76	3 16 0

By a similar calculation a porker team which took 158 days to grow to 65lb. carcass average (even though born in mid-October) reveals a loss of £2 12s. per pig. This team was 52 days older than standard for its weight.

One of these slow-grown teams qualified for major prize money in the carcass championship. In comparing the merit of the performance of this team with that of any of the teams in the merit list in Table 4 it becomes clear that the principle of offering

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OBTAINABLE FROM YOUR MILKING MACHINE MAKER OR SUPPLY HOUSE.

Mr. W. G. Bell, of Ardmore, with his teams of baconers and porkers which established the record aggregate of 730 points for carcass quality and 892 for growth-rate and carcass quality combined.

considerable cash prizes for a carcass championship which does not take farm performance into account has an obvious flaw.

More Entries; More Merit Teams

The growth-rate section not only had record entries this year, but a considerably higher percentage of teams in each category reached the 70 per cent. of total points to qualify for merit standard. Almost two-thirds of the porker teams and well over half the baconer teams competing have reached merit standard this year. This reflects the increased interest being taken by those entering in this section.

High Quality Produced Efficiently

Worthy of special mention is the performance of teams entered in both the porker and baconer sections of the growth-rate competition by Mr. W. G. Bell, of Ardmore, Papakura. The porkers were the outstanding team on carcass quality and probably would have lost nothing in this respect if they had grown slightly faster. They were 8 days older than the standard for their weight.

The baconers, scoring 357 for carcass, were 13 days older than standard. However, the aggregate scores of 456 for the porker team and 436 for the baconer, giving a combined teams' aggregate of 892 points, will be very difficult to improve on.

Carcass Quality Only

Table 5 sets out in separate sections the teams of baconers, porkers, and combined teams which produced high-quality carcasses, scoring 80 per cent. or more of the possible points for carcass in single teams and 75 per cent. or more of the possible in combined teams. These are highly creditable performances in the production of a marketable commodity, but, as previously indicated, the true merit from the angle of farm performance and hence profitability cannot be defined as accurately as in the teams included in Table 4.

Conclusion

The increased support for the growth-rate section of these competitions is a desirable trend and the higher proportion of merit teams in this section indicates that those taking part are getting benefit from their participation. It is hoped that this will continue and that more incentive can be provided for those willing to take the extra trouble necessary to compete in this section, where a high standard of performance has undoubted merit.

Considering the amount of work involved in these competitions it might be argued that the stage has been reached when entries should be accepted only from litters for which growth data are available.

All photographs by Sparrow.

***TABLE 5—CARCASS QUALITY POINTS ONLY: TEAMS SCORING 80 PER CENT. OR MORE OF POSSIBLE POINTS AND COMBINED TEAMS SCORING 75 PER CENT. OR MORE OF AGGREGATE POINTS**

The details below are given in the following order: Exhibitor; breeding of pigs; points (possible: baconers and porkers 420 each, combined 840).

BACONERS

J. B. Topp, Ormond, Gisborne; L.W.; 361
Mt. St. Mary's Mission, Greenmeadows; L.W. x B.; 355
F. A. Buckley, Manutuke; T. x L.W.; 352
W. M. Wardrop, Tauranga; L.W.; 351
P. D. Darby, Bombay; L.W. x B.; 347
H. E. Johnson and Co., Whangarei; L.W.; 339
K. Sewell, Patutahi; L.W. x (T. x B.); 338
V. H. W. Groves, Patutahi; T. x B.; 338
V. H. W. Groves, Patutahi; T. x B.; 337
R. W. Hamilton, Patutahi; L.W. x B.; 336

PORKERS

R. G. Holmes, Galatea; L.W.; 356
L. McDonald, Bombay; L.W.; 344
R. S. A. Mutton, Te Puke; L.W.; 341
R. M. Edgar, Tokoroa; L.W.; 339
R. A. Julian, Kakaramea; L.W.; 339
P. D. Darby, Bombay; L.W. x B.; 339
K. Sewell, Patutahi; L.W. x (T. x B.); 338
J. Todd, Cambridge; B. x L.W.; 337

COMBINED TEAMS

W. G. Bell, Ardmore; L.W.; 730
H. A. and A. D. Aitken, Waverley; L.W. x B.; 697
F. A. Buckley, Manutuke; T. x B.; 692
S. J. Hooper, Muriwai, Gisborne; L.W. x B.; 691
P. D. Darby, Bombay; L.W. x B.; 686
R. G. Holmes, Galatea; L.W.; 680
N. A. Fraser, jun., Kawakawa; L.W.; 676
Fowell Bros., Howick; L.W.; 672
Fowell Bros., Howick; B. x L.W.; 669
H. E. Johnson and Co., Whangarei; L.W.; 669
J. W. Risi, Ngaruawahia; T. x L.W.; 664
L. F. Eustace, Hawera, L.W.; 642
J. F. Bremner, Pahiatua; L.W.; 642
L. E. Scott, Eltham; L.W.; 630

* Table 5 does not include teams reaching the standard which are already included in Table 4.

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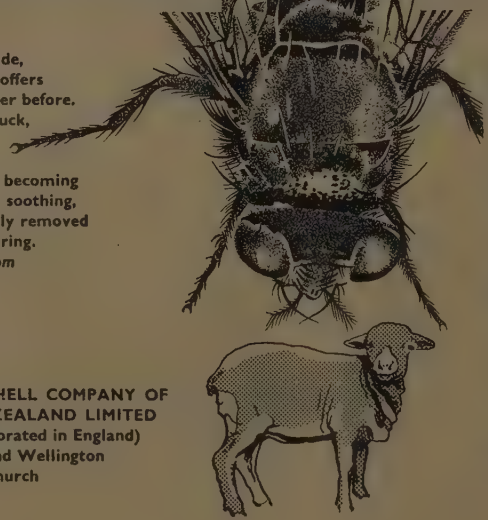

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A Versatile Land Leveller

By L. H. WESTON,
Machinery Instructor, Department of Agriculture, Dunedin

THE machine shown in the illustration at right can be used with any tractor of 15 h.p. or more. It is manoeuvrable, easily used, simply adjusted, and requires only one operator. It levels, digs shallow ditches, and can be used as an angle dozer. This type of leveller has wide application throughout New Zealand wherever a low-priced, large-capacity leveller is required for development work or for general farm improvement.

A SOUTHLAND farmer, Mr. W. Hegan, of Otahuti, began building such a leveller to assist in the development of virgin bush country. Levelling was essential for successful mole draining. This simple design proved very effective and inexpensive. It was used in the preparation of the seed-bed for crops and at the same time reduced the amount of cultivation required. After two or three successive crops and the cultivation, with levelling, necessary for sowing down in grass, the ground was well levelled. This procedure has been adopted by Mr. Hegan and the many other local farmers who are using this type of leveller.

A trailing leveller manufactured in Southland. The wheels are pivoted and can be quickly adjusted for height by the lever and ratchet in front of each wheel. The blade is 10ft. long and 1ft. deep and is set to skim soil from high spots, automatically dropping it in hollows.

The machine is favoured because of these advantages:—

1. It has a large capacity when removing knobs and ridges. Mr. Hegan's leveller carries about ½ cub. yd.

2. It is manoeuvrable and can be reversed safely.

3. Only one operator is required and very little skill is necessary.

The trailing leveller consists of a frame on rubber-tyred wheels and with a grader blade placed on the frame about one-third of the distance from the wheels to the hitch. The wheels or the hitch must be adjustable for height so that the blade will automatically skim the soil from the higher areas, depositing it in the hollows. The most satisfactory method of working is to cover the field systematically as with any other cultivation implement.

The versatility of the machine is increased by making provision for

The leveller with the blade angled. Adjusted in this way it can be used for road grading, for ditching, or for preparation of ground for irrigation.

VERSATILE LAND LEVELLER

A simple farm-made leveller of the type described. This machine has been used effectively by a Balclutha farmer engaged in commercial potato growing.

angling the blade. This facilitates work on farm tracks, the digging of shallow ditches, and even putting up borders for irrigation. The side draught on the machine can be countered by dragging a blade or "fin" through the soil. The fin can be seen partly obscuring the left wheel in the upper illustration on page 499. In the lower illustration on the same page it is working. One farmer has further increased the usefulness of his leveller by removing the blade, fitting a deck, and using it as a rubber-tyred farm trailer as well.

Though it would probably be a more effective earth-moving machine hitched to a tractor with a hydraulic drawbar, the emphasis is on its use with a tractor not fitted with a hydraulic lift. As a trailing leveller it has become popular enough to demand manufacture. It is yet another implement on rubber tyres, quickly transported, easily worked, and very effective.

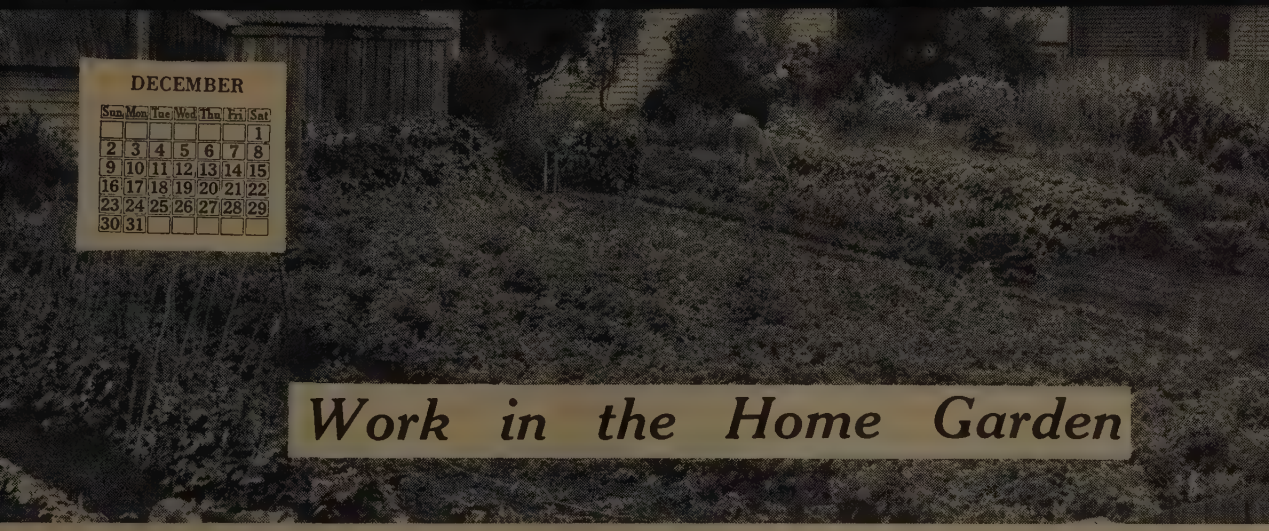
Bulk Fertiliser Storage Shed

MANY bulk fertiliser stores have already been built, particularly in the North Island. The Department of Agriculture is interested in this development and hopes to see the establishment of depots at all suitable points distant from works. Local conditions should determine whether there should be large regional units complete with modern handling equipment or smaller units on airstrips or individual farms or a combination of both. In the following article A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui, suggests a type of depot suitable for an airstrip. This one is filled by tip-trucks, which empty their loads through openings in the roof; it is emptied by an aerial topdressing company with its normal bulk handling equipment.

USE of this type of shed is limited to locations which have elevated ground directly alongside the air strip. The site is excavated so that the roof of the shed will be approximately level with the bank. The bank is then levelled off or filled to make it uniform along the length of the shed to facilitate both the movement and tipping of the trucks. Some form of breastwork is required at the bank side of the shed to stop the earth moving under the weight of the trucks. A substantial iron rail is placed along the length of the shed, about a foot from it, to take any impact from the tip-truck.

Three sections of the roof swing open (two are open in the illustration) and this arrangement allows the shed to be filled along its length. The sections are 8ft. wide, the length of an 8ft. sheet of iron, and swing on a ⅜in. bolt in the rafters. The rafters are spaced at the sides of the openings to allow a free flow of the superphosphate. There are gaps in the roof between the swinging sections and these are covered with removable half sheets of iron which slide under the sheets on the top side. A heavy post is placed on this removable portion to keep it in place in windy weather.

The shed is 30ft. long and 16ft. wide (external measurements), and the superphosphate can be built up to a height of 10ft. The capacity of the shed when completely filled is 120 tons (a ton of superphosphate occupies 33 cub. ft.). However, in practice the shed is not completely filled. The superphosphate forms a cone at the tipping points and there are three cones of superphosphate rather than an evenly filled shed; the shed illustrated holds 80 to 90 tons. To increase the capacity further the cones have to be levelled with a shovel or other suitable implement. The walls of the shed are reinforced to take the outward thrust of the fertiliser, the weight of which is not taken directly on the door but on a series of replaceable boards on the inside of the stud.



Work in the Home Garden

HOME gardeners who go away for their Christmas and New Year holidays have a special need to keep up to date with garden work in December. Tiny weeds left in late December may be large enough by late January to suppress crop plants. Winter greens such as winter cabbage and cauliflower (broccoli), leeks, and kale are best set out in most districts by mid-January. If the gardener is to be away for an extended period, plants should usually be set out in late December, except in districts having a long, mild autumn, when they may mature too quickly from an early planting. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses some of the work in the home garden in December.

POTATO tubers should be kept well covered to guard against tuber moth attack and prevent greening and the soil moulded to as sharp a ridge as possible to guard against blight. The pulling of main-crop rhubarb should be discontinued, particularly where conditions are dry. Successional sowings may be made of most vegetables, particularly the salad crops, and swedes and peas can be sown if the supply of moisture can be assured. Parsnips can still be sown, though it is rather late for this in some southern districts unless growing conditions are good.

Tomatoes, apart from dwarf varieties, need pruning, staking, tying, and, except in some southern districts, spraying with DDT against caterpillars and with bordeaux mixture or suitable Government-certified substitute against fungous disease. Tall crops, such as runner beans, are best staked, though these beans may be grown as bush plants by nipping out the tops.

Weed killing is very important among established crops, as weeds deprive crop plants of food and moisture and are often the means by which insect pests and diseases are carried over from season to season. Many new weedkillers effective for certain crops have been developed in recent years, but in the home garden hoeing is usually still the most effective way of controlling weeds among crops.

Liquid manure can be applied with advantage to most crops in ground lacking plant food, and where necessary watering or irrigation should be attended to. The supply of water is particularly important to the growth and setting of beans, to the growth of lettuce and celery, and to only a slightly less extent to that of other greens.

Asparagus

Asparagus harvesting usually finishes about the end of November or middle of December according to district and the condition of the beds. Cutting should not be continued too long or future production may be impaired. As soon as cutting is finished the beds should be cleared of weeds, cultivated, and dressed with a balanced fertiliser which should be worked into the topsoil. This is necessary to stimulate the development of strong healthy fern growth by which the roots are able to store up food for next season's growth. Strong fern growth also assists the suppression of weeds, so that the beds should need little further attention during summer.

Broccoli or Winter Cauliflower

Broccoli is, for all practical purposes, a hardy winter cauliflower and does not differ from the cauliflower usually grown for summer use except in hardiness and stronger development (in most varieties) of the leaves encircling the head. Varieties are available which mature in from about 5 to 12 months.

Transplanting is usually done in December or January, though in districts having a long, mild autumn or where conditions are moist and reasonably free from severe frost, some varieties can be set out in February.

[*Green and Hahn*

Except for weed control and, where weather is boisterous, a certain amount of earthing up of the stems to stabilise the plants, broccoli planted in rich, well-drained, and well-cultivated soil should require little attention.

As the curd begins to develop a leaf or two should be bent over it to give protection from frost. Modern strains of broccoli produced by reputable seed firms are on the whole fairly reliable and mature according to their specified periods, but mild autumn weather, particularly if it is sunny, moist, and warm, is liable to alter the timetable.

Varieties should be chosen to mature in succession to provide supplies over as long a period as desired. Examples of varieties which mature successionally are American No. 1, which produces heads in June and July, American No. 2, heading in August and September, and American No. 3, heading during September and October. Other examples are Winter Mammoth, maturing in mid-winter; Superb Winter White, maturing in June, July, and sometimes August; Lily White, maturing in July and August; St. Valentine, maturing in August and September; Late White, maturing in spring.

Non-heading Varieties of Broccoli

In addition to the common broccoli there are several kinds of non-heading or sprouting broccoli well worth growing. They produce a terminal main head on a fleshy branching stalk, but after the main head has been removed side heads or shoots continue to form on most varieties and may be picked for a considerable period. Varieties of sprouting broccoli vary in the time taken to reach maturity from about 3½ to 12 months. Quick-maturing varieties are treated like cabbage and the slow-maturing ones usually like broccoli. They vary in height from about 15in. to about 36in. Varieties include Italian Green Sprouting (Calabrese), Early Purple Sprouting,

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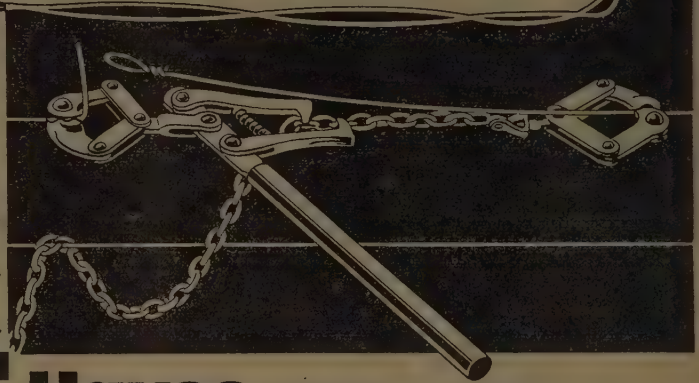

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Late Purple Sprouting, and White Sprouting.

Borecole or Kale

There are several varieties of borecole or kale and all are very hardy. Cultivation of most varieties is similar to that of brussels sprouts. They deserve to be more commonly grown in New Zealand gardens, because good strains are among the most delicious and health giving of vegetables. The coarse-leaved, strong-flavoured kinds are responsible for most of the prejudice against kales.

Kale matures according to variety and conditions in from about 2 to 5 months and is grown mainly as a winter vegetable. Of the other types, asparagus kale, which has distinctive, long, thin shoots that resemble sprouting broccoli rather than asparagus and produces its edible branches in spring, is one of the best for the home garden. It produces tender shoots of excellent flavour and stands through winter, coming into bearing in spring, when many gardens are bare of greens.

Generally, the common varieties fall into two groups: Dwarf, about 12in. to 24in. high, and tall, about 30in. Plants should be set out 18in. to 24in. apart (according to height) in rows 30in. apart.

Brussels Sprouts

Brussels sprouts have a well-deserved popularity and are not difficult to grow. The main needs are a deeply cultivated, rich, firm soil, adequate moisture, good spacing, a long season of growth and, where aphids are troublesome, regular spraying with nicotine sulphate or HETP.

Purchase of good strains of plants is important. In New Zealand, varieties are rarely classified, but overseas they are usually listed according to height and occasionally to maturity. Good types of brussels sprouts should form sprouts early and uniformly and the sprouts should last well without bursting. The sprouts should be set closely, but not so close that picking is difficult, and should be firm, of good size, round, compact, and a healthy green. Plants should also be resistant to adverse weather and aphids. (Some

New Medium for Raising Vegetable and Flower Seedlings

AN investigation into the most suitable method of growing cress at the New Zealand Antarctic party's Ross Sea base showed that seedlings as good as those grown in a potting soil were produced in coarse expanded perlite which had received fortnightly dressings of a dry fertiliser mixture. The method, modified for the production of flower and vegetable seedlings, has many advantages over the use of potting soil.

Expanded perlite is sterilised during its manufacture, it is light (a tenth of the weight of soil), and dries out very slowly after watering. Seedlings are easily pricked out, the medium cannot be overwatered if adequate drainage holes are provided in the containers, and there are no weeds to worry about. A succession of short-rotation crops such as lettuce can be obtained from a single sowing by pricking out from the germination dishes only as many seedlings as are required. The remainder will live on in the perlite which has received no fertiliser without increasing in size and can be pricked out for a later sowing.

The coarse grade of expanded perlite now on the market in New Zealand is ideal for plant growth. Clean kerosene tins cut in halves lengthwise make ideal containers for seedlings, and any small, shallow tin is suitable for seed germination. All containers should have ample small drainage holes in the bottom and should never be composed of galvanised iron, owing to the risk of ill effect on the seedlings from zinc used in the galvanising.

The Method

Sow the seeds in perlite in the small tin and stand it in water to saturate the perlite. Remove to a warm position and preferably cover with glass. Do not add fertiliser to the germinating seeds. When the seed leaves are fully expanded flood the tin completely in water. While it is flooded the seedlings can be simply pulled out one by one and transplanted to moist perlite in the larger tins. As long as they are not pulled too hard seedling roots will come out without breakage. Five to six dozen seedlings can be grown in each half of the kerosene tin.

After transplanting, spread the dry fertiliser over the surface of the perlite at 1 heaped teaspoon per square foot, being careful to leave none on the plant leaves. Now carefully water the surface until drainage just starts to run out of the bottom of the tin. Add the fertiliser in this manner once a fortnight and water the plants once a week until they are ready for final setting out in the garden.

In preparing the fertiliser use commercial-grade compounds (those normally applied to gardens) and if perlite is used as the medium, no nutrient deficiencies will develop. Though the fertiliser recipe given below was found the best for a wide range of plants, this can be safely altered by doubling or halving the amount of one compound at a time; for instance, leafy plants may require more nitrate of soda.

Plants 4½ weeks after pricking out.

Fertiliser Mixture

	Part by weight
Superphosphate	7
Nitrate of soda	12
Sulphate of potash	3
Epsom-salt (magnesium sulphate) ..	4

These compounds should be crushed to a powder and thoroughly mixed.

Perlite is cheap enough to be thrown out after several crops have been raised in it or, better, spread over the garden as a soil conditioner.

—*T. M. MORRISON,*
Biologist, Soil Bureau Experimental Station, Department of Scientific and Industrial Research, Taita

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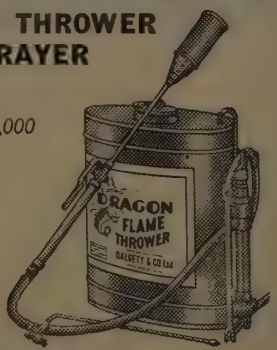

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varieties are more resistant to aphids than others.)

Brussels sprouts succeed on a wide range of soils, but if grown on land too rich in nitrogenous material, they usually grow too vigorously and produce many loose, open, poor sprouts. Soil richly manured with organic material for a previous crop is best, and for the growth of the sprouts it can be dressed with artificial manure, as too much organic matter may tend to make the soil spongy, and firmness is needed for good sprouts. A complete fertiliser generally gives best results, though usually the dressing should have a high proportion of phosphoric acid, which can be supplied as superphosphate.

In home gardens where space permits and brussels sprouts are favoured several crops can be grown each year. A first sowing in sheltered conditions or under glass in July or August can be followed by one or more successional sowings, the last usually in November, provided that, in southern districts, there is a sufficient period for the plants to develop fully before winter.

Early varieties include Cambridge No. 1 and Harrison's XXX, both of medium habit with large sprouts. Main-crop varieties include Evesham's Special, a tall variety with medium sprouts, Evesham's Selected, a medium variety with large sprouts, and Covent Garden and Ormskirk Giant, tall varieties with large sprouts. Late varieties include Cambridge No. 5 and Scrymger's Giant, both large varieties with large sprouts.

Carrots

Carrots are among the most useful winter vegetables. Where there is enough moisture in the ground December sowing is satisfactory. Control of aphids and, in northern districts, carrot rust fly is very important. These were discussed in last month's "Journal".

Celery

December and January are the preferred months in most districts for setting out celery. Most seedsmen sell boxes or smaller lots of self-blanching varieties such as Golden Plume and Golden Self-blanching and the older varieties such as Solid White, which are not usually so much in demand, as they are more difficult to blanch successfully.

However, blanching is not essential and unblanched celery has many uses and is considered by some to be more nutritious than blanched celery. Methods of planting were described in last month's "Journal".

Cucumbers

Cucumbers need warm, sunny, sheltered situations. The leaves are sensitive to injury from strong sunlight and wind and adequate moisture is essential for good results. Soil should be rich and well supplied with moisture. Weeding should be rigorous.

[*Sparrow*

Watering and feeding will be facilitated if celery is set out in a trench or shallow depression.

Leeks

Though leeks can be set out earlier and (in districts where autumn is sufficiently mild) later than December and January, these are the preferred months for planting. A good plan is to have two or more plantings. In most districts an early, a mid-season, and a late planting will ensure a supply of leeks from autumn until late spring.

Leeks are a great standby and are very easily grown. They are rarely affected by insect pests or disease, and though cabbage and cauliflower (or broccoli) mature according to their season and are available or in best condition only then, leeks stand well and may be used over many months.

Plants can be set out 6in. to 8in. apart in rows 12in. apart. A trench 3in. to 4in. deep can be drawn out with a hoe and holes made with a dibble somewhat deeper than the white portion of the plants to be set out. Plants can then be dropped in the holes and left with portion of the green tops (the long ends of which may be cut off) protruding. If the plants are watered, it will not be necessary to fill the holes, as the soil will gradually erode and fill them. Where the soil is heavy and sticky the holes should be made with a trowel, as a dibble will consolidate it too much.

Preferably, soil for leeks should be rich in organic manure, but where the water-table is sufficiently high excellent crops can be grown with artificial fertilisers alone. A complete fertiliser (one rich in nitrogen, phosphoric acid, and potash) should be applied and thoroughly incorporated throughout the bed at 3oz. to 4oz. per square yard.

Varieties include London or Broad Flag, which is best grown for early

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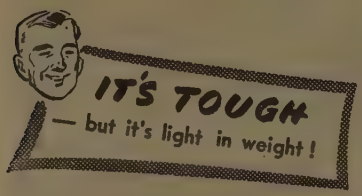

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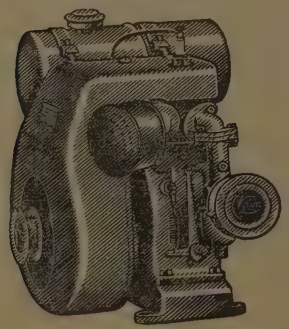

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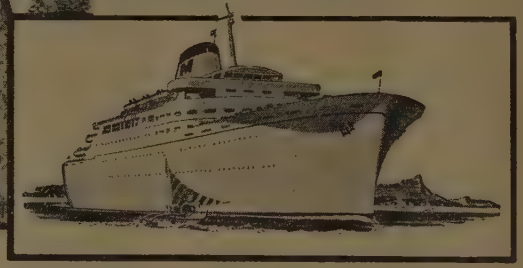

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use; Musselburgh, which is a very hardy variety usually characterised by its long, blanched stem; and Lyon, which is generally similar to London, but grows larger and is slower maturing. Lyon is a good variety for a late crop, as it is slow in running to seed.

Peas

Powdery mildew is often serious on pea crops in dry weather and peas should be grown only where good cultural conditions can be maintained, that is, in moist, well-drained soils of good humus content. Control of powdery mildew is difficult in conditions which favour the disease, but dusting with finely ground sulphur or spraying with colloidal sulphur usually gives good control.

Potatoes

December is rather late for planting potatoes and the success achieved will depend mainly on the district or dryness of the season. It is usually advisable to choose an early or second-early variety for such a late planting.

Potatoes need a well-drained soil rich in humus. If fertiliser is required, it can be supplied by dusting a mixture of 3 parts of superphosphate and 1 part of sulphate of ammonia in the trench at 6oz. to 12oz. to every 6yds. of row before planting.

Cut or whole tubers can be planted 10in. to 16in. apart in a trench 4in. to 5in. deep taken out with a hoe. For early and very late planting a close spacing can be adopted.

The moulding or earthing up of the main potato crop and the digging of the early crop should now be proceeding. The ridges should be finished off to as sharp a point as possible to prevent the spores of potato blight from being washed down by rain to infect the tubers. It is not advisable to earth up when the soil is wet. Blight attack depends largely on the weather. Frequent spells of moist, warm weather are conducive to attack and where the weather favours the disease preventive spraying with bordeaux mixture or a suitable Government-certified substitute is advisable.

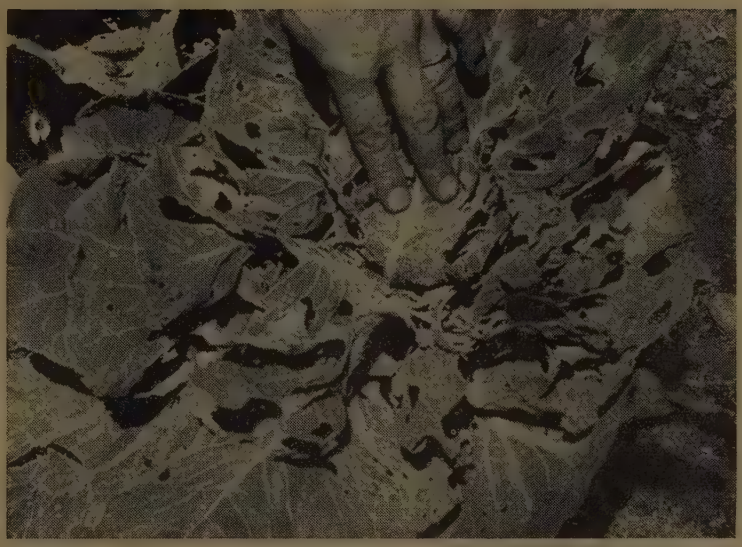
Potato blight is first seen as irregular, dark brown, water-soaked areas on leaves and stems. The leaves become limp and there may be mildew on the under sides in moist weather. The stems blacken and decay. Tubers should not be lifted when there are blight spots on the leaves, as tubers may become contaminated and later may rot in storage. Infected haulms should be removed before digging. If there is a doubt about the presence of blight on the tubers, they should not be stored.

Potato Scab

There are two types of scab which infect potatoes, ordinary scab and powdery scab. They do not differ greatly in appearance, though powdery scab may develop a canker, which is much more serious. Generally, scab shows as scabby spots varying from roughened, shallow depressions to corky protrusions. Barriers of cork are laid down by the tuber in an effort to exclude the scab-producing organisms. Scab may reduce the yield by 10 per cent.

Control consists of avoiding soils which have recently been heavily limed or to which heavy dressings of organic manure have recently been applied. Heavy dressings of organic matter applied the previous year so that they are thoroughly decomposed are satisfactory.

Very acid soils inhibit the development of the parasite, but apart from soil acidity the development of potato scab is influenced by soil moisture and temperature. Its development is usually favoured by conditions where soil moisture is slightly below that giving good growth.



[*Green and Hahn*

Cabbages can be protected against caterpillar damage such as that shown by spraying or dusting plants with DDT.

Radishes

Small successional sowings of radish seed should be made as required. Cultural requirements of radish are similar to those of carrots and beet, but as the crop matures much more quickly, it is more sensitive to adverse conditions. The soil should be well drained and the top 6in. cultivated to a very fine tilth. It should be very rich in fine, well-rotted organic matter; well-rotted compost is excellent.

Seeds should be sown thinly (12 to 15 to 1ft.) ½in. deep in rows which need be only 4in. to 6in. apart. The soil should be gently firmed after sowing, as the roots do not bulb well in loose soil. Seed can also be sown broadcast, but weeding is then more difficult.

The roots should never dry out and in mid-summer shelter from the sun is advisable. This is best achieved by sowing in the shade of a taller crop.

The value of radishes lies in their fresh crispness and mild pungency. Pungency and fibre are, however, so greatly increased by slow growth or checks that in adverse conditions radishes are likely to be hot, pithy, and indigestible.

Radishes can be sown at any time of the year in well-drained soil, provided there is sufficient moisture and ground temperature is high enough.

Rhubarb

Treatment of the main varieties of rhubarb is somewhat similar to that recommended for asparagus. Harvesting of the main crop should not last beyond about 8 weeks, though this depends on the vigour of the plants, the amount of harvesting done, and the moisture content and fertility of the ground. After harvesting has been completed the plants should be given a dressing of farmyard manure, stack bottom, compost, or similar material or a complete fertiliser.

Where space permits, a good plan is to have several plants of each of three varieties. An early variety which can be forced by covering it early in spring with straw or a good-sized box can be followed, as soon as

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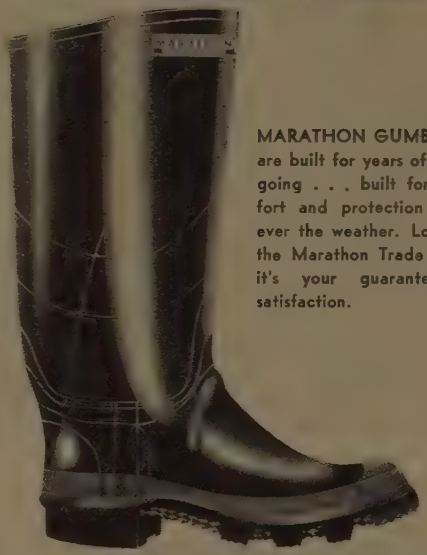

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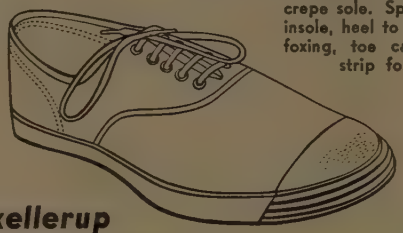

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PACIFIC SALT

By Skellerup

the early plants require resting, by a main-crop variety which should provide supplies until small fruits are generally available. Finally, an everbearing variety can be grown to provide supplies in late autumn and winter.

Many varieties of rhubarb in home gardens are affected by virus disease, which may or may not have a serious effect on yield. It usually shows up as light and dark mottling of the leaves, which sometimes become streaked and highly coloured as they die down. Crowns infected by virus should be destroyed and care should be taken not to spread the disease to healthy plants by handling infected plants and then handling healthy ones. Washing of the hands will remove infection.

Shallots

The harvesting of shallots can be begun as soon as the bulbs are mature and the roots have started to rot. Proper drying off of the bulbs is important and if the weather is unfavourable, they should be laid under cover in trays in a dry shed.

Swede Turnips

In growing conditions that suit them swede turnips mature in from 55 to 90 days. Growth and yield are greatly influenced by weather. Varieties that require a long growing season thrive best in a cool, moist climate with neither dry periods nor very heavy rain. Sunshine is not important and longer-maturing varieties generally do best in late autumn, when sunshine is reduced and there is sufficient moisture.

Good swedes are a very useful addition to the home garden, particularly in the south, where cooler and moister conditions enhance their quality and flavour. Swedes are high yielding and, like turnips, do not require special soil, provided drainage is good and there is adequate moisture. They respond well to a soil moderately rich in well-rotted organic matter. A dressing of superphosphate at 1oz. to 2oz. a square yard is advantageous on many soils, though on most home garden soils that have been cropped for many years a complete fertiliser will give improved results.

Where the soil is not too dry swedes can now be sown in December, though November sowing is preferred in some southern districts. Swedes should be kept growing without check, as otherwise they tend to be woody and tasteless. They are usually preferred as a winter vegetable, and if sown late, they keep well under cool conditions. Seed should be sown ¼in. to ½in. deep in rows 12in. to 15in. apart and the plants later thinned to 6in. to 8in. apart in the rows. Good varieties include Laings Garden (medium) and Superlative.

In some districts swedes are affected by an internal breakdown known as brown heart. It can be detected first when the plant is about 2in. in diameter. If the root is cut deeply so that a right-angle piece is removed, a clearly defined zone will be seen near the centre with areas mottled greyish, brownish, and glassy, usually concentrically or radially. Leaves may be curled and brittle and the bulbs woody with a bitter taste. Brown heart is caused by a deficiency of the element boron. It can be overcome by the application of ordinary borax, though in the home garden liberal dressings of organic manure will usually correct the deficiency. The ground should not be limed.

[*Sparrow*

In most northern districts tomatoes should be sprayed regularly with fungicides and insecticides against diseases and pests. Government-certified preparations should be used.

Tomatoes

Early December is not too late to plant out tomatoes where plants have not yet been set out. The ground has by then warmed sufficiently to enable young plants to start into vigorous growth immediately instead of standing still as often happens with very early plantings. The soil should be in good condition and a complete fertiliser should be applied over the proposed line of planting.

On many soils the application of ½ pint of liquid manure (made by dissolving 8oz. of superphosphate and 4oz. of sulphate of ammonia in 4 gallons of water) to each hole before planting has proved of great value in giving plants a start. The liquid manure should not be allowed to touch the foliage.

Virus Infection

Few crops are subject to as many diseases as the tomato, and plants set out earlier should be watched for disease. Plants that show any symptoms of virus infection, for which there is no curative treatment, should be destroyed at once. Distortion of the young leaves or mosaic mottling may indicate infection with this type of disease, different types and combinations of which vary in their effect on plants.

Plants which develop narrow, often distorted, fern-like leaves or have a stunted appearance usually produce little if any crop and should be removed and burnt. Those infested with spotted wilt, shown in the early stages by a bronzing (often very fine) of the foliage with a pattern of brown spots toward the base of the top leaflets and usually later by a stunted appearance and a rolling and bunching of the top leaves, should also be burnt. Spotted wilt is one of the most serious diseases with which the tomato grower has to contend. It is commonly spread from diseased to healthy plants by thrips, minute, dark, cigar-shaped insects about 1/16in. long with fine, hair-like or brush-like wings; the larvae are usually yellowish green.

Many garden plants such as Iceland poppy, chrysanthemum, lettuce, nasturtium, aster, dahlia, and zinnia are subject to spotted wilt and also serve to carry over the disease from season to season. Thrips are sometimes difficult to control, as they have such a wide range of host plants and in the warm, sheltered conditions which suit tomatoes they are prolific breeders. Regular spraying with DDT is usually effective against them, as it is against stem-borer caterpillar and looper caterpillar, two other common pests of tomatoes.

Blight

Where potato blight is troublesome bordeaux mixture or a suitable Government-certified substitute should also be used. The first spray should be applied about 7 to 10 days after planting out, and thereafter spraying should be repeated every 2 to 4 weeks according to the weather and the extent to which the disease is troublesome.

Established tomato plants, except dwarf varieties, should be pruned regularly by the removal of side shoots which grow from the main stem at each branch. Tying and supporting by stakes or a fence or trellis are usually necessary.

Home Cleaning

By EVELYN E. MOORE,

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IN the October issue of the "Journal" some of the more general aspects of house cleaning were discussed. This article deals with cleaning problems likely to be encountered in the kitchen, bathroom, and laundry. In addition suggestions are given for removing some of the more common stains which may occur on carpets, walls, and furniture, and a list of useful and economical household cleaners is included.

Kitchen Equipment

MODERN kitchen equipment is designed to reduce care and cleaning to a minimum, but this does not mean it can be treated carelessly. Most of the common materials used for bench and table tops and for equipment, such as porcelain, enamel, laminated plastics and other types of plastic, terrazzo, tiles or aluminium, can be scratched, stained, chipped, or dented with rough treatment. On the other hand with proper care they will continue to look attractive and remain easy to clean for many years.

Porcelain Enamel and Enamelware

Varying qualities of enamel are widely used for stoves, refrigerators, and cooking utensils. It is simple to clean and keep clean, provided harsh abrasives such as sandsoap and the metal-type pot cleaners are avoided, as they cause the enamel surface to be progressively roughened, making each new cleaning harder than the previous one, and ultimately, of course, they may wear right through the enamel.

It is important to remember that enamel saucepans absorb heat quickly but spread it unevenly, and are thus more likely to burn foods unless the heat is carefully controlled. Incidentally metal pot scrapers and gritty scouring powders which scratch the enamel surface also increase the likelihood of food burning to the bottom of the pans. Burnt saucepans should always be soaked and cleaned, rather than scrubbed clean, but if the food is badly burnt on, cooling the pan, filling it with water to which 1 or 2 tablespoons of baking soda have been added, and bringing the water to the boil may help.

Steel wool is not recommended, as it streaks enamelware with fine black lines.

HEADING PHOTOGRAPH: Absorbents such as blotting paper and salt should be used instead of a cloth for mopping up fluids such as ink spilt on a carpet, as a cloth may spread the stain and help to rub it into the carpet and thus make it more difficult to remove completely.

Waxing and polishing, where practicable—on refrigerators, for example—helps preserve the original finish and gloss.

Cleaners which may be effective on enamelware when all else fails include bleaching solutions used according to directions or a thin paste of cream of tartar and hydrogen peroxide. With a stiff brush rub the paste over the stain and leave it for a short time before thoroughly washing and rinsing the area. These substances and other acid cleaners damage enamel surfaces, but their use is preferable, for example, to scraping and possibly chipping the surface with a knife or rubbing it with pumice stone.

The cleaner made from cream of tartar and hydrogen peroxide may often work wonders on brown-stained enamel sinks, but once the sink is clean every effort should be made to keep it clean with mild cleaners and soap and water.

Aluminium Ware

As aluminium is rapidly blackened or at best develops a dull, drab appearance after repeated contact with alkalis, strongly alkaline soaps or soap powders, washing soda and baking soda or built detergents should not be used to clean aluminium ware, and, of course, strong soda solutions should not be boiled up in aluminium ware in the hope of cleaning it or removing burnt-on residue. The reverse effect occurs.

New aluminium utensils can be kept bright and shining for a long time by being cleaned with mild soaps or detergents alone. If a pot scrub is needed to remove porridge or milk residue, for example, a very stiff brush designed for pot cleaning or one of the plastic-type pot scrubs should be used in preference to metal pot scrubs, as these are much more injurious to the surface of the saucepan and their regular use can soon be responsible for pitting, which makes the saucepan difficult to clean. Steel wool may be used occasionally to shine old saucepans, but the pan should be well rinsed afterward. Used regularly steel wool causes excessive wear.

When such alkaline foods as broad beans, potatoes, or eggs are boiled in aluminium saucepans the surface is darkened, but this does not injure the food in any way. Acid foods such as rhubarb can be cooked in the saucepans or the discoloration can be removed by boiling water and cream of tartar (2 teaspoons of cream of tartar to each quart of water) together in the saucepan.

Lime scale which forms on teakettles and electric jugs in hard-water areas can be loosened with a mixture of equal quantities of boiling water and vinegar. Let this stand in the kettle overnight, then scrape out the deposit with a pot scrub or steel wool.

Aluminium ware should not be used for long storage of liquid foods, as pitting of the metal can result from the reaction of substances in the food on the metal. There is no danger of food poisoning, but the life of the utensils may be shortened and they are made harder to clean.

Other Metals and Alloys

Stainless steel, chromium, and similar metals and alloys are easy to clean and keep clean. Used in electric jugs, toasters, and other electrical equipment and for bench tops, all they should need is regular wiping with a damp cloth. If they become dull, they may be polished with a special metal polish recommended for using on them. The interior of some chromium-plated equipment available today is roughly finished. This stains quickly and easily if not washed and wiped thoroughly dry after use.

Terrazzo and Marble Bench Surfaces

Terrazzo and marble are hard, durable, and heat resistant. They can, however, be chipped and scratched by rough treatment, and the surface can be roughened and pitted by cleaning materials and food acids, especially fruit syrups, vinegar, lemon juice and

The oven is much easier to clean and keep clean if spills are wiped up as soon as possible. Mild abrasive powders are useful for removing stubborn spots and stains.

milk. Therefore, if possible, avoid storing such substances on or near terrazzo bench surfaces, as frequent small spills and drips which may not be noticed can ultimately cause considerable damage. To keep them clean and shining, therefore, always use chopping boards, wash them with warm, soapy water, rinse them with clean water, and wipe them dry after use. Polishing may make these bench surfaces unduly slippery.

Plastic Bench Surfaces

Two types of plastic bench surfaces are available, one is laminated with a metal inlay and is heat resistant, the other is moulded plastic and melts at high baking temperatures and is generally less durable, though it will wear quite well if properly cared for. Both types will scratch and chip with rough treatment and pot stands, chopping boards, etc., should always be used to protect the surface, and care should be taken to avoid dropping heavy equipment or utensils on them.

Though laminated plastic is heat resistant, evidence suggests that some varieties are not completely resistant to some of the higher temperatures (400 to 500 degrees F.) needed for frying and baking, and hot frying pans and baking trays placed directly on the plastic have been known to cause splintering of the material.

Otherwise little care is needed, as these plastics are resistant to food stains, and wiping them with a damp cloth is sufficient to keep them clean and shining. They may be waxed and polished if desired.

Wooden Benches, Chopping Boards, and Other Wooden Equipment

Today untreated wooden benches and tables are rapidly being replaced by other surface materials. However, for chopping boards, pastry boards, and bread boards wood is still one of the most efficient materials, and a little care can keep such equipment looking clean and attractive.

Perhaps the most important thing to remember is that wood absorbs water and is cracked or warped easily if it remains long in contact with it. Clean all wooden ware promptly after use. Wipe it down with cold water, wash it in lukewarm water, rinse it, and dry it immediately. If it is necessary to scrub wooden benches or table tops, avoid using strongly alkaline cleaners, which cause wood to yellow with repeated use. Scrub with the grain of the wood, rinse, and wipe dry immediately. Soaking wooden ware, washing it in very hot water, or standing it on edge to dry are not recommended, as all can cause the wood to warp or split.

Electric Stoves

In addition to regular care and cleaning of an electric stove a few special precautions will increase the life of the porcelain enamel finish on top of the stove.

Unless the surface units project slightly (¼in. approximately) above the level of the range platform, avoid using pans too large for the elements, as they may cause discoloration and crazing of the enamel with which they are in contact. Handle heavy pans carefully to avoid chipping the enamel. If food boils over, wipe it up as soon as possible with a cloth wrung out of hot water, as porcelain enamel is a form of glass and can be cracked by too sudden changes of temperature.

Surface units: Spilt foods should be burnt off open units. Place a pan of water on the element, turn the switch to high, and heat until the food remnants are completely charred; they may then be brushed or wiped off the elements, which can be removed according to instructions given with the stove. Do not use stiff brushes and knives to scrape elements clean, as they may cause damage. The surfaces of enclosed elements may be rubbed with fine steel wool or whiting to remove burnt particles or rust.

If rusting is a problem, as in beach cottages where stoves may not be used for long periods, the elements may be cleaned, dried, and covered with a very thin coating of wax. Cooking fat which often contains salt will not prevent rusting; it may even make it worse. Little can be done with badly rusted elements; prevention by keeping them dry, wiping up spills, and ensuring that salt and other corrosive substances are wiped up carefully is the better plan.

It is important that reflector trays under the elements and in some of the smaller ovens be kept shining and bright, because they aid in the heat output of units and in controlling oven heat.

Ovens: Dry ovens out thoroughly after use by leaving the door slightly open to allow steam to escape. Foods which have spilt in the oven are more easily removed if they are wiped up as soon as possible. Simple precautions, such as standing a casserole which may boil over in a roasting pan, can save long, awkward cleaning jobs. Soaking burnt areas, where practicable, in soapy water before cleaning also helps make such tasks easier.

Excessively greasy ovens can be cleaned more readily with ammonia. Pour about ½ cup of household ammonia—not cloudy ammonia, which may not be so effective—in a shallow pan and put it on the oven rack and leave it overnight, close the door, and cover the vent if it is easily reached. Fumes from the ammonia loosen the grease and simplify the task of cleaning with hot, soapy water the next day. When necessary the plastic-type scouring pads or mild abrasive powders may be used for stubborn spots.

If the oven door has a window, clean it by rubbing it with a damp cloth dipped in baking soda. Clean crumb trays and storage drawers periodically with hot, soapy water and wipe them dry before replacing them in the stove.

Refrigerators and Freezers

Though the suggestions given here are general and would apply to most refrigerators, it is wise to keep the manufacturer's instructions handy and to follow them conscientiously.

Regular defrosting is, of course, essential, as allowing frost to accumulate to a thickness of much more than ¼in. reduces the efficiency of the refrigerator. Even when automatic defrosting units are in use the refrigerator still requires regular cleaning to keep it fresh and free from unpleasant odours. It is, of course, a good idea to choose a time when there is little food in the refrigerator, but if this is impossible, and if, for instance, frozen foods are being stored in the freezing unit, quick defrosting can be achieved harmlessly by placing pans of very hot water in the freezing compartment.

If the frozen food is taken out and well wrapped, it will not come to any harm in the ¼ hour required for defrosting. A solution of baking soda and warm water (1 tablespoon of soda dissolved in 1 quart of water) is recommended for cleaning the interior. It is not necessary to use cleaning powders or detergents. Wipe dry the freezing unit, interior of the refrigerator, and trays and clean the rubber seal round the door thoroughly with warm water and soda, as fat, soaps, and some cleaning solutions, if left on the rubber, can cause it to perish gradually.

If ice is required, ice cube trays should be filled with fresh water. Wipe up spills before the food has a chance to harden and remember that some food acids destroy the glaze on some types of enamel finish. Occasional wiping with a clean, damp cloth is all that is required for the outside of the refrigerator, though it may be waxed and polished with a light wax polish to preserve the lustre of the finish.

The care of the motor depends on the type. Some require regular oiling and adjusting, but sealed units require little care. Special care is needed for the mechanism of kerosene or gas refrigerators, as it is on cleanliness that their efficiency depends. Making the time and the effort to understand the mechanism thoroughly when the refrigerator is installed will perhaps save much annoyance later.

Freezers need the same general care as refrigerators, but need defrosting only once or twice a year. If they seem to frost up too rapidly, it may be due to foods not being properly wrapped and therefore losing moisture. Wipe up spilt material at once.

Finally, to achieve better refrigeration at minimum cost the following points are made by manufacturers.

Do not open the door unnecessarily and do not overcrowd the refrigerator or obstruct the top of the refrigerator so that air cannot circulate freely. Cool foods before storing and store them in covered dishes or glass jars, check the cold control after making ice cream, and defrost regularly.

Other Electrical Equipment

Gentle, regular care also pays with other electrical equipment, as all reliable makes are designed with the principles of ease in caring for and using them in mind.

The majority have resistant enamel or chromium alloy surfaces and seldom need more than regular wiping after use with a clean damp cloth.

Check up on whether regular oiling is necessary for electric mixer motors, for example, and make sure the manufacturer's instructions are read carefully and understood before using the equipment.

Bathrooms

Paintwork walls and the floor of a bathroom should be given proper treatment. Soap can soon cause paint to flake and wear off around baths and basins. Though it is naturally difficult to avoid this, unless it is possible to train the family not to slop soapy water around, it may be worth noting when it is time for repainting that some of the newer "plastic" gloss paints are more resistant to soap than the conventional oil-based paints. It is important that linoleum or rubber floors be kept as dry as possible, as water can seep through seams and cause the backing to rot or glue to fail, and curling and lifting, especially of linoleum tiles, can easily occur.

Baths and Washbasins

Cleaning of baths and washbasins is, of course, greatly simplified if members of the family can be persuaded to rinse and wipe the bath and basin out each time they use them, as this prevents the formation of hard-to-clean layers of scum. For regular daily cleaning either a little kerosene or turpentine on a damp cloth or water containing trisodium phosphate is good for removing the soap scum which is particularly troublesome in hard-water areas.

The use of many new types of washing powders has made it more important to care for wringer rollers properly if they are to last well. When the wringer is not in use the screw or spring should always be released, and as an added precaution a towel should be placed between the rollers to prevent their sticking together.

For a thorough cleaning one of the mild, non-scratchy cleaning powders or whiting may be used. Harsh abrasives may remove stains more quickly, but they soon damage the bath surface, making subsequent cleanings more and more difficult. Taps and chromium fittings do not require any special polishing. Wiping with a damp cloth and polishing with a clean, dry one will leave them bright and shining.

The most common and troublesome stain on baths and washbasins is rust, which can sometimes be removed by rubbing with lemon juice or lemon juice and salt. Rinse the lemon juice thoroughly away after use. If this fails, a 5 per cent. solution of oxalic acid may be obtained from a chemist and sponged lightly over the stain. Rinse it away thoroughly, using a little ammonia in the first rinse water. It is desirable to protect the hands with rubber gloves when using oxalic acid.

When a bath has become thoroughly stained and discoloured and ordinary cleaners have no effect on it, the paste of cream of tartar and hydrogen peroxide suggested for cleaning badly stained enamel may be effective. Such baths have usually long since lost their original glossy finish, and therefore stain more readily. However, such treatments should be used only rarely, a possible exception being in areas with badly iron-stained water.

Lavatories

Again daily cleaning should be the rule for lavatories, and the special brushes available should be used. About once a week pour a hot, strong washing soda solution (2oz. to 1 quart of water) into the pan and brush the pan vigorously. Wipe and rinse and dry the outside of the pan. Neglected pans can sometimes be cleaned with Javelle water or one of the proprietary cleaners.

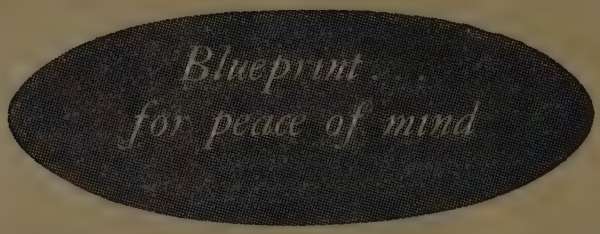
Laundry Equipment

Washboilers

Wash and dry washboilers immediately after use. If additional cleaning is necessary, use a mild paste or powder cleaner while it is still warm.

Washing Machines

The method of cleaning a washing machine is largely dependent on the type of machine, and in this respect the housewife should be sure she understands all the manufacturer's



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instructions and must carry them out as recommended if she is to have trouble-free, efficient washing. Of particular importance with wringer-type machines since synthetic detergents have come into general use is the instruction always to release the wringers, rinse them clean, and dry them after use. If the rollers do not clear each other when released, place paper or cloth between them to keep them apart. If this is not done, the life of the wringer rollers is shortened even if ordinary soaps and powders are used, but if synthetic detergents are used, the rollers tend to stick together under pressure and strips of rubber may be torn off when they are again moved.

Whatever the make of machine clean and rinse it after use and leave it open for ventilation. Automatic washers are self-cleaning to a considerable degree, but some have soap compartments and lint traps which should not be neglected.

Finally, two things are of importance for good results. Do not overload the washing machine. Overloading results in a dingy wash and sometimes damages the motor. Use enough soap or detergent to make good standing suds about 2in. high for most efficient washing.

Irons

Irons and ironers also work better and last longer when well cared for. It is important to choose good equipment such as better-quality irons and adjustable ironing boards in the beginning; the work of ironing may thereby be made much easier. If starch sticks to the sole plate of the iron, wipe the plate with a cloth wrung out of hot, soapy water and rub it with a fine, smooth abrasive such as whiting. If the ironing surface is rubbed occasionally with a little high-grade paraffin or beeswax, the tendency for starch to stick will be lessened. Excessive wax should, of course, be wiped off. Never scrape starch off with a knife. The chromium plating is very easily scratched and if badly damaged, it may start to peel off, thus greatly hindering smooth ironing and increasing the tendency for starch to stick to the iron.

Removing Difficult Stains

From Carpets

Food and grease stains are the most common stains on carpets. Treat them as soon as possible for easier removal. Fresh stains can usually be removed with carbon tetrachloride. Work from the edge of the stain toward the centre, using the fluid sparingly, and change the cloth to a clean place as it becomes soiled.

Synthetic detergent or soap solutions can be used for some spots, but it is advisable if one is not certain of the quality of the dyes used in the carpet or mat to test them first in an inconspicuous place. Use soap or detergent suds and avoid getting the carpet too wet.

Ink stains can often be removed by immediate treatment with an absorbent followed by vigorous shampooing. Blotting paper works speedily and effectively; salt or any other dry household absorbent may be used in an emergency. However, avoid rubbing the ink into the fibres and backing with a cloth, as this makes the stain more difficult to remove.

Ink stains which have dried on, especially if the carpet is new and valuable, are better treated by professional cleaners. If this is impracticable, however, commercial ink removers or lemon juice and salt or a 5 per cent. solution of oxalic acid may be tried. Sometimes these may change the rug colours, and oxalic acid particularly should be carefully rinsed away. If the colours have changed, sponging with ammonia may bring them back to normal. This is also valuable for neutralising the acid.

Stains from chewing gum and plastic modelling material and similar stains: Freezing with an ice cube helps to make these materials more brittle and they may therefore be more readily scraped off the carpet. Avoid damaging the carpet in the process, however. Lumps which have become firmly embedded in the carpet can sometimes be softened by saturating them with carbon tetrachloride. Then as much as possible of the material should be removed and the treatment repeated as necessary. Carbon tetrachloride should not be used on rubber-backed carpets.

Shoe polish may usually be removed with turpentine or carbon tetrachloride.

Medicine stains are very frequently a problem, as the medicine contents are often unknown. A few general suggestions are given. Rub gummy medicine stains with petroleum jelly or lard and then sponge them with carbon tetrachloride. Use soap or detergent suds on cough medicine stains. Sponge stains containing colour with denatured alcohol, but as this may also remove some carpet dyes, try it out first on an inconspicuous spot.

From Wallpapers

The more stubborn **grease stains** on wallpapers and those caused by some types of fly spray can sometimes be improved by spreading a paste of cornflour and carbon tetrachloride over the stains. Spread the paste over the stain, leave it to dry, and brush it off, and if it has improved but not completely removed the stain, repeat the treatment. Pencil marks are best removed with a soft, good rubber; a dry-cleaning fluid or carbon tetrachloride will sometimes remove waxy crayon marks, and methylated spirit is probably the most successful eraser of ballpoint ink. A wide variety of writing inks is available today, some of which can be fairly easily washed away with soap and water; others produce much more stubborn stains. The housewife may save herself much trouble if she buys the type of ink that can be easily removed if it is spilt.

Stubborn **ink stains** and other bad stains on wallpapers are best patched or papered over. A suggestion for making the patch inconspicuous when a piece of matching wallpaper is available is to tear out a patch of the requisite size instead of cutting out a neat square or oblong. Be careful to hold the paper and tear it so that the thin torn edge which makes an inconspicuous join possible is on the right side of the paper.

From Wooden Furniture

Watermarks: An application of liquid cleaning and polishing wax may be effective, but if not, try placing a thick, clean blotter over the area and pressing with a warm (not hot) iron. Repeat this treatment until the watermark rings are removed. The camphorated oil treatment recommended later for heat marks may also be helpful.

Alcohol spots: Alcohol quickly dissolves many of the special finishes used on furniture and leaves dull, unsightly spots. Immediate treatment is therefore advisable. Blot the liquid up as quickly as possible with an absorbent blotter or soft, lintless cloth. Be careful not to spread the stained area by rubbing with the cloth as the stain is mopped up. Polish the area vigorously with a liquid polishing wax.

Old marks may sometimes be improved by rubbing the area with a mixture of powdered pumice, powdered silver polish, or cigar ash and raw or boiled linseed oil. Stroke in the direction of the grain and then wipe the area with a cloth moistened with linseed oil. Finally, polish the area well.

Burns, if not severe, may be covered with a stain-concealing polish. Otherwise, try linseed oil and powdered pumice or silver polish as described for alcohol spots. Repeat the process if necessary.

Heat marks: A cloth dampened with camphorated oil or turpentine will often remove the white marks caused by hot dishes. Rub the stain lightly. Another treatment, but one requiring more care and one which should be tried generally only if the above method fails, is the use of methylated spirit. Pour one or two (not more) drops of methylated spirit on to a pad of cottonwool. Cover this with a double layer of muslin and rub well over and around the marks. Sufficient

stain and polish from around the marks will be removed to mask them.

Ink stains: For success immediate treatment with a blotter is again advisable. Often this is all that is necessary on polished surfaces. If a slight stain still remains, however, apply a dampened cloth to the stain and press it down firmly, turn the cloth to a clean place, and repeat the process until no more ink is removed. Do not rub the ink in. Ink stains on unpolished wood can sometimes be removed by brushing them with a solution of oxalic acid (¼ teaspoon dissolved in ¼ pint of warm water). Do not spread the acid over the wood; apply it only to the stain. Leave it a few moments, then mop it up and wash the surface thoroughly with warm, soapy water to which a little ammonia has been added. Repeat the process if necessary and finally rinse the area well. As oxalic acid is poisonous, it should be used with care.

Scratches: Waxing or repolishing and rubbing a little extra polish into scratches will remove many of them. If they still remain, carefully brush a little turpentine into them, let it dry, and then polish the surface. Do not use turpentine too generously, as it may soften the finish. Scratches on dark-stained wood can often be made less obvious by rubbing them with a cut brazil nut or walnut. Iodine is helpful painted into scratches on furniture with a mahogany-type finish, and brown shoe dyes and polishes can also be used when they match the colour of the surrounding varnish or stain.

From Upholstered Furniture

Generally the rules for removing special stains from fabrics can be followed successfully (see articles in "Journal of Agriculture" February and March 1950).

Briefly, the rules are:—

1. Test an inconspicuous part of the cover for colour fastness to the remover being used.
2. For removing grease or food stains use the absolute minimum quantity of warm suds or grease solvent and rub gently, working from the outside of the stain toward the centre. It is better to work slowly and avoid the formation of rings, which can be very difficult to remove.

Cleaning and Stain-removing Materials

Following are listed some useful cleaning and stain-removing materials. The list is divided into two parts. The first suggests materials which the housewife may find convenient to have always at hand; the second lists those substances less frequently required, but which might be bought for a special stain-removing job. Many proprietary cleaners are available to replace any or all of these substances and may be found more convenient to use. However, as their ingredients are seldom described on the label, they should always be used with caution when being tried out on new materials; for example, dry-cleaning or paint-removing solvents could contain acetone, a substance which destroys cellulose acetate fabrics.

Materials for Cleaning

French chalk, powdered starch or cornflour, fuller's earth, or talcum powder for absorbing grease stains, ink stains, etc.

Ammonia for cleaning windows, grease stains, neutralising acids, and freshening or renewing colours changed by acids.

Baking soda for cleaning refrigerators. Use this where strong alkaline cleaners may cause damage.

Borax is a useful mild alkali for washing new woollen materials. Its value as a water softener has been overrated. It is useful also for grease removal.

Carbon tetrachloride (available from a chemist) is a non-inflammable dry-cleaning fluid. Its fumes are poisonous, so it should be used only in a well-ventilated room or out of doors. It is useful for tar stains.

Kerosene has a wide variety of household uses as a grease solvent, in cleaning baths and sinks, removing brands from flour bags, etc.

Linseed oil is useful for removing some types of furniture stains and is also used on oiled floors.

Methylated spirit for removing grease, ballpoint ink, and grass stains, etc.

Mineral turpentine is a useful grease solvent and is useful also for removing paint stains, shoe polish stains, etc.

Neatsfoot oil (obtainable from leather shops) is a useful leather reconditioner. Do not use it on leather goods that are to be polished.

Polishing waxes (liquid, paste, and emulsion types): Choose the appropriate wax for the work to be done. They help preserve paintwork, furniture, floors, etc.

Synthetic detergents and soaps: Choose varieties appropriate for the work to be done. Synthetic detergents are useful in hard-water areas, but they may have washing soda and other strongly alkaline substances mixed with them and therefore should be used with care and discretion.

Turpentine is a useful paint and grease solvent.

Upholstery or carpet shampoos are usually non-alkaline, synthetic detergents.

Washing soda for routine cleaning of drains and greasy pots and pans; it is an excellent water softener.

Whiting (available from paint stores) is a useful, safe, fine abrasive or scouring powder.

Useful Stain Removers

Household bleaches (available from grocers and chemists): The most common have a chlorine base. They are strong bleaches suitable only for cottons, linens, and fast-coloured rayons. They should not be used regularly as they greatly weaken the fibres. They may be used to whiten badly discoloured wood floors and enamels. Hydrogen peroxide is a safe, mild bleach which can be used on wool and fibres other than cotton and linen and also in household stain removal. Oxalic acid is poisonous, but is useful for bleaching away iron stains. Dye removers may occasionally be used for specific tasks.

Glycerine for soaking and helping in the removal of stubborn fruit, tannin, and medicine stains.

Oil of eucalyptus for removing many stains including grease, sticking plaster, pine gum, oil stains, etc.

Photographers' "hypo" for iodine stains.

Petroleum jelly (or lard) for rubbing into all stubborn stains such as tar, car grease, etc., to facilitate their removal with solvents.

Dry-cleaning fluids: There is a variety of commercial preparations available. It is safer to choose non-inflammable ones like carbon tetrachloride, but other popular ones include petrol, acetone, and amyl acetate. Acetone is particularly useful for removing aeroplane glue and some types of paint, but should never be used on cellulose acetate fabrics, as it dissolves them. Petrol and other inflammable cleaners are useful for removing car grease and similar stains, but should always be used with the greatest care.

Powdered pepsin (obtainable from a chemist) for softening stubborn stains with a protein basis such as milk (on rayons), eggs, blood, ice cream, glue, and certain medicines. It should be obtained fresh for best results, and the material should be washed completely free from soap before it is used.

To summarise, regular cleaning can make the work of home cleaning much easier. Following of the manufacturers' instructions for care and cleaning is important if maximum service is to be obtained from equipment and furnishings. The golden rule in cleaning up spills and stains could well be "Do it now".

Manuring the Flower Garden

EARLIER articles in this series have stressed the importance of cultivation, organic matter, and plant nutrients for the satisfactory growth and flowering of plants. In this article J. P. Salinger, Horticulturist, Department of Agriculture, Wellington, discusses in detail the use of manures and fertilisers in the flower garden. Notes on garden work for December are by Elspeth Gray, Horticultural Instructor, Department of Agriculture, Auckland.

THERE are very few soils sufficiently fertile to grow plants satisfactorily without manuring, and the gardener must supply the requirements of plants in a suitable form and at the correct time. Different plants have different requirements both in soil texture and in manuring; for instance, rhododendrons are not grown or manured in the same way as roses.

The home gardener will be applying manures, fertilisers, and lime in one form or another, and a dressing of blood and bone or superphosphate applied indiscriminately round the garden can be wasteful or unnecessary. A realisation of plant requirements will enable the gardener to choose the manures or fertilisers which he thinks the plants require and apply these in the most suitable form.

There is no exact distinction between manure and fertilisers, but for practical purposes manures are considered to be derived from organic materials and fertilisers from inorganic materials. Manures can be divided into bulky manures such as sheep manure or compost and processed manures, like blood and bone, which are used in the same way as fertilisers. It can be realised that bulky manure will provide organic matter, but on the other hand organic matter may provide only a very small quantity of plant nutrients.

Unless very large quantities of bulky manures are available, it is usually necessary to supplement them with fertilisers. Some gardeners contend that it is possible to maintain fertility in the garden solely with compost. This may be so where a large supply of compost is always available often supplemented with animal manure, but the home gardener will generally find that a combination of compost and fertilisers will give better results.

Compost

Compost is plant material which has been acted on by bacteria to bring it to a state of decomposition suitable for applying to the soil. Compost is organic matter, because it is derived from living material, but it is not humus, until it is in such an advanced stage of decay that the original material cannot be recognised.

Most gardeners depend on compost to supply the organic matter required for the garden, and well-made compost will serve this purpose.

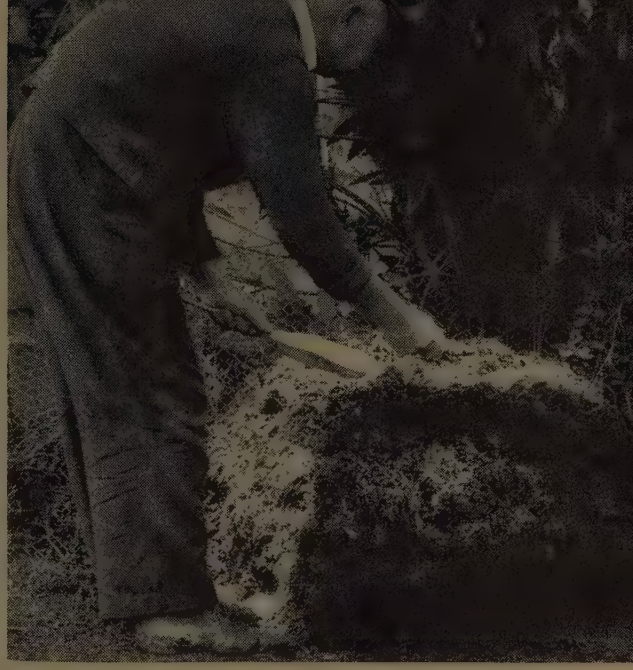
To make compost efficiently the following materials are required:—

1. Soft non-woody vegetable matter.
2. An activator.
3. Air and water.

It is the action of bacteria and other organisms with adequate air, water, and chemical nutrients that breaks down the vegetable matter to a suitable form for the garden. The quicker this action takes place the better is the compost. A heap which has taken 9 months to rot down will provide poor-quality compost.

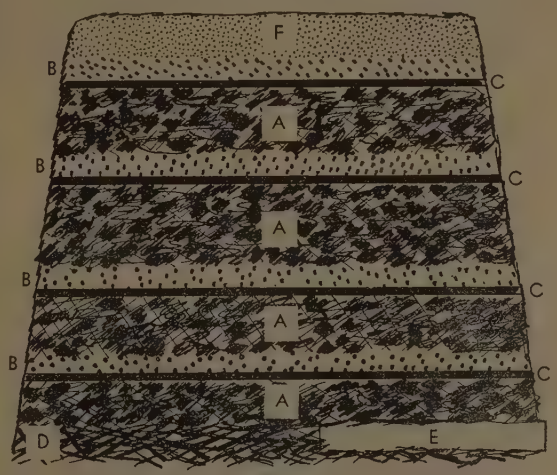
Making a Compost Heap

Compost may be made in the open air in a pit or as a heap; best of all it should be made in covered bins.



[*Sparrow*

Lime being added to a compost heap made from lawn mowings. A small heap built in the open from soft, green material will rot quickly in summer. In winter it will rot too slowly and poorer-quality compost will be produced.



Section through a compost heap. A—Garden trash or household refuse to be rotted (layers usually about 6in. to 8in. thick). B—Material to speed rotting (that is, the activator). It may be fowl or animal manure, a heavy sprinkling of dried blood or blood and bone, or a sprinkling of nitrogenous fertiliser such as sulphate of ammonia. C—A sprinkling of carbonate of lime (ground limestone or common garden lime) can be used every 6in. to 8in. as the heap is being built. D—Twiggy material such as hedge clippings to provide aeration. E—Pipe for aeration. Adequate ventilation to induce a good draught through the mass is essential in the first stages of composting, but in the maturing heap it is not required, and may even be wasteful of organic matter such as nitrogen and ammonia. Pipes should be blocked or removed in the later, maturing stages of the heap. F—Soil to retain heat and for hygiene. Thin soil layers can be added as the heap is built.

The Albion Line Clipper "Dunedin" which carried the first refrigerated cargo from New Zealand to London in February, 1882.

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Back in 1872, a group of people in New Zealand looked into the future. They saw a growing world demand for New Zealand products. They saw a growing need by New Zealand for Manufactured goods. They saw that New Zealand must have, not just ships, but a regular unfailing shipping link with the world overseas. And they founded the New Zealand Shipping Company.

Its beginnings were small, but New Zealand developed fast.

Other shipping lines appeared, operating in some cases only when freights were plentiful, skimming the cream and leaving the residue. Such competition, however, uncontrolled and unrestricted quickly created problems for both shippers and shipowners.

In the common interest some measure of co-ordination was clearly essential; and out of that necessity came the organisation later to be known as the New Zealand Conference.

It is nothing more and nothing less than a Conference of separate entities, each with its own ships, its own methods, its own traditions of service. But they have some things in common and most important of these is the determination to see that New Zealand has always the shipping link with the world which the country needs.

And, if you still call that a 'monopoly', ask yourself this question: How else could New Zealand have the benefit in good times and bad of the greatest volume of highly-specialised refrigerated tonnage in the world, running to all intents and purposes, as far as New Zealand is concerned, as one fleet and capable of handling seasonal peaks of dairy produce, wool, meat and fruit month in and month out? How else could her producers have the advantage of freight rates which can be known in advance and stabilised for long periods ahead?

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Garden weeds and rubbish thrown into a pit will decay, but the process is slow and few weed seeds are destroyed. A pit can easily become waterlogged and the ensuing compost will be wet and have a sour smell. This type of compost is likely to be of little value.

A compost heap in the open is more satisfactory, but if only a small amount of material is added each time, the heap decomposes slowly. In summer the heap may dry out and in winter it may become too wet. In any case the outer layers of the heap will not be fully decomposed.

Where heaps are built in the open they should be surrounded by wire netting to keep them tidy and some protection such as corrugated iron should be placed over the top to run off excessive rain. Once a heap is completed it should be covered with a layer of soil.

Compost bins are the most efficient method. Normally, three bins are sufficient and they should be built of movable boards of preserved timber fitting loosely together. The bins should be covered with easily lifted lids. A heap should be built of layers of vegetable matter about 6in. to 8in. thick, and a dressing of activator applied to each layer.

[*Green and Hahn*

A large wooden framework divided into three sections is the cleanest and most efficient method of making compost. The compost box should be fitted with a lid to shed rain and should have slatted sides so that each section can be filled or emptied separately.

Building the Heap

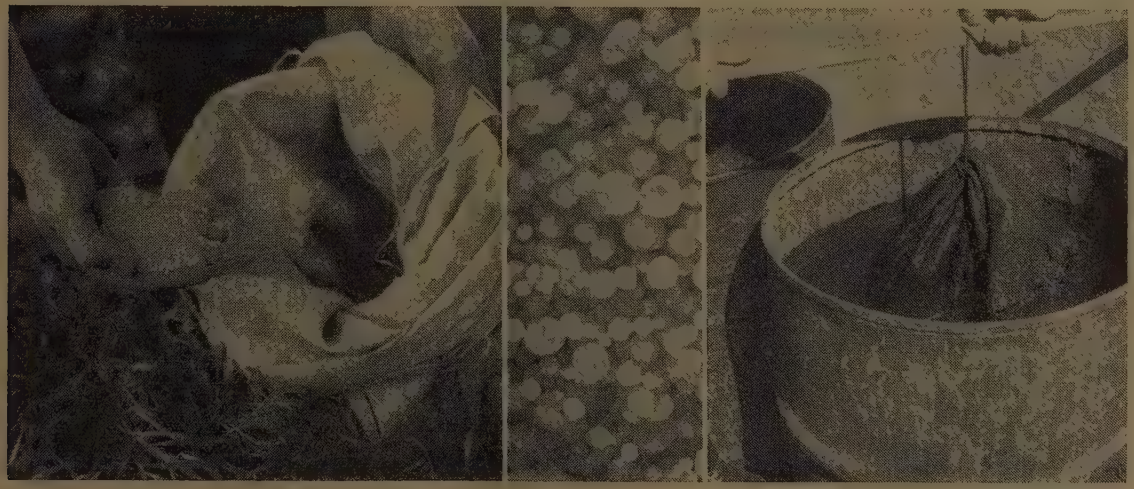
The usual materials available to the gardener for composting are the trimmings or remains of vegetable crops, lawn mowings, soft hedge clippings, weeds, leaves, coarse grass, and household and kitchen refuse. Seaweed can also be used and sawdust to a limited extent if the other constituents are very green or wet.

The following materials should not be composted:—

Tins and oily paper, weeds which are going to seed, woody hedge clippings, and garden plants and vegetables which are obviously diseased, especially with virus and root diseases such as club root. Scraps of meat or fish should not be included unless the composting is very efficiently carried out; otherwise these provide a breeding ground for houseflies. Even in well-made heaps tiny flies known as vinegar flies will sometimes appear. These can be killed by dusting the heap occasionally with DDT or lindane garden dust or by applying a layer of sawdust over each layer of vegetable matter. Wood ashes and soot are useful, but coal ashes should be added in very limited amounts and only if the garden soil is very heavy.

The Activator

Though leafy material will break down slowly, the process can be hastened by the use of an activator.



[*Green and Hahn*

Left—Superphosphate is a good source of phosphorus, which is especially important in flower, fruit, and seed production and in encouraging root growth in young plants. Centre—Nitrate of soda is a quick-acting nitrogenous fertiliser for applying as side-dressings. Right—Making liquid manure by suspending a sack containing animal manure or soot in a drum of water. For hygienic reasons this type of manure should be used up within a month.

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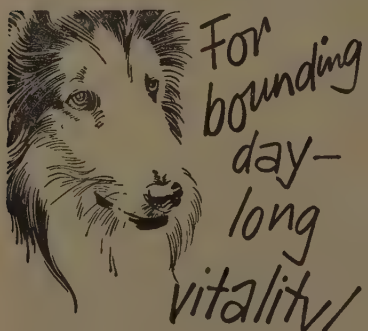

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This either supplies additional decomposing organisms to the heap or adds nutrients for these organisms to use. The best activator is animal manure. Stable, sheep, and poultry manure are all excellent and it is no disadvantage if they are already mixed with litter, though a thicker layer should be used if this is so. Proprietary activators are quite good. They usually consist of bacteria in a dried form or of chemicals to stimulate the bacteria.

If neither of the former materials is used, the heap can be dusted with a nitrogenous fertiliser such as sulphate of ammonia and occasionally with lime, both at 2lb. to 1cwt. of material. Once a heap has been built or a bin filled the compost should be turned and the outer layers brought to the inside. If the heap is exposed to the air, it may have dried out and it should then be watered. Alternatively, if a heap is built in tightly fitting bins or is very wet, ventilation holes will be required. These can be made by driving a hoe handle or crowbar vertically through the heap about a foot from the sides of the heap.

Well-made and well-rotted compost can be forked into the topsoil before the plants are set out or it can be used as a mulch in summer.

If the compost has decayed slowly or was made mainly of slowly decomposing woody material, it is advisable to add nitrogen when applying the compost to the soil. An ounce of sulphate of ammonia or 2oz. of blood and bone per sq. yd. will overcome a temporary nitrogen deficiency in the soil.

Manures and Other Composts

Several local authorities are now producing compost from town refuse. This material is more concentrated and has a higher nutrient value than the average home garden compost. Smaller quantities should therefore be used.

Where the home gardener applies 1 bushel of garden compost to 4 sq. yds. a dressing of ¼ bushel of town-refuse compost would be sufficient.

Stable, sheep, and poultry manure are all excellent for supplying organic matter and nutrients. Stable manure is especially valuable for digging in before a herbaceous border is planted. Sheep manure and sheep dags, though valuable in their plant food content, frequently bring quantities of weeds into the garden and, especially in the flower garden, are of doubtful value for this reason. The greatest value of this type of manure is as a mulch in summer rather than dug in round permanent plants like roses. Poultry manure, especially the dry material obtained from deep litter houses, is an excellent balanced manure and should be applied at 1 bushel to 16 sq. yds. Poultry manure which has been stacked in the open and allowed to become wet soon loses its manurial value, nitrogen especially being lost. In such cases it is best used as a mulch.

Poultry manure from a deep litter poultry house is an excellent manure for the flower garden; it supplies organic matter and all the major plant nutrients. If kept dry, it is clean and easy to handle.

If dug in, additional nitrogen will be required.

Cow manure is excellent for freely drained soils. On clay soils it should be mixed with plenty of litter to provide a coarser, more open manure.

Liming

Lime can have both a physical and chemical effect on the soil, but these two conditions cannot be separated. In itself it is not a fertiliser.

Most gardeners apply lime to overcome soil acidity; as a result of manuring with organic matter and applying fertilisers such as sulphate of ammonia the soil solution becomes more acid. Liming after the use of these materials is often called "sweetening the soil".

The Use of Lime

Unless a garden soil is known to be extremely acid, it is unwise to apply heavy dressings of lime. In the average cultivated garden a light dressing of agricultural lime at 4oz. to the square yard annually should be sufficient. As the flower garden is seldom completely free of plants, it is not always possible or advisable to apply lime all over the garden at one time. In such cases the lime should be applied before planting spring or summer flowering bedding plants and in winter to the herbaceous border. The soil round most trees and shrubs does not require to be limed annually, as many of these plants prefer a slightly acid soil. Overliming can be harmful, as it tends to make other elements less available to plants.

Acidity is measured in the laboratory by a scale known as pH.

This figure is often quoted in technical articles and is of importance in obtaining a good lawn from fine leaved grasses. The pH figures do not give a direct statement of the presence or quantity of calcium in the soil, but they give an indication whether or not lime is required, and if the poor growth of plants is directly due to an acid or alkaline soil.

The following table relates the pH figure with acidity or alkalinity:—

pH	
4.5 and lower	very strongly acid
4.5-5.2	strongly acid
5.3-6.4	medium acid
6.5-6.9	slightly acid
7.0	neutral
7.1-7.5	slightly alkaline
7.6-8.2	medium alkaline
8.3-9.5	strongly alkaline

Though pH 7.0 is neutral the majority of plants tolerate an acidity of pH 6.5 and it is seldom necessary to bring the pH level to 7.0 by additional liming.

Plants which are members of the ericaceae family such as rhododendrons, azaleas, ericas, kalmias, and also most lilies are intolerant of excess lime and are therefore considered to be acid-loving plants. Alternatively, other plants will tolerate alkaline conditions, which may be due not only to free lime present in the soil, but also to the presence of mineral salts due to flooding by the sea or a very low rainfall. The families of plants tolerant of this condition are less clearly defined, but plants of the pink family (*Caryophyllaceae*), pea family (*Leguminosae*), and irises are suitable for these conditions.

Types of Lime Available

Lime can be purchased in three forms, burnt lime (calcium oxide), hydrated lime (calcium hydroxide), and agricultural or garden lime (calcium carbonate). Depending on the district from which the original limestone rock is obtained the percentage of calcium oxide varies with the product. From a gardener's point of view 1lb. of burnt lime is equivalent to 1½lb. of hydrated lime and 2lb. of carbonate of lime.

Calcium is often referred to as Ca in books and soil analyses.

Burnt lime is caustic and difficult to store, as it absorbs moisture easily to become hydrated lime and eventually reverts to calcium carbonate. It has only a limited use in the flower garden, mainly for dusting on the soil round plants to repel slugs and snails, but even for this purpose it will not retain its original value for long. It should be stored in sealed tins.

Hydrated lime or **Slaked lime** is more valuable. It stores well and in general is harmless to plants, though

in seed-beds it should be applied 10 to 14 days before sowing the seed, as it may affect germination. It is also used in making up bordeaux mixture, but as it can revert to calcium carbonate if exposed to the air, it should be stored in a lidded tin.

Agricultural or **Garden lime** is the type of lime most frequently purchased by the gardener. It is often sold in strong paper sacks. It is not caustic and does not deteriorate if stored in a dry place. This is the best form of lime to use for soil dressings in the flower garden and as it does not affect seed germination, it can be applied, if necessary, immediately before sowing seeds. The quality of carbonate of lime is determined by the fineness of the particles, not by the colour, which depends on the parent rock from which it was obtained.

Plant Nutrients

Human beings require a mixed and balanced diet, and in the same way plants require at least 16 chemical elements to make satisfactory growth. These elements are mainly taken up in solution from the soil and apart from calcium, which has been described under liming, three major nutrients are required in large amounts. These are nitrogen, phosphorus, and potassium. Others are needed in lesser amounts in average garden soil, as they are present in the mineral particles of the soil. The remainder are required in minute quantities and are known as trace elements. Their absence or unavailability to plants causes trace element deficiencies.

Nitrogen, phosphorus, and potassium are all present in bulky organic manures, but as these are usually supplemented with fertilisers, it is necessary to know what the fertilisers contain and the action of these elements on plant growth.

For ease of reference the abbreviated chemical names are given and the percentage of the element in the manure is expressed either as the element itself or as a compound. The following are the standard abbreviations for the element and the form in which it is described in a manure or fertiliser:—

Element	Abbreviation	Expressed as
Nitrogen	N	N or nitrogen
Phosphorus	P	P_2O_5 or phosphate
Potassium (potash)	K	K_2O, Potassium oxide
Calcium	Ca	CaO, Calcium oxide or Ca, Calcium

The following effects of nitrogen, phosphorus, and potassium on plant growth can be summarised. The form in which they are applied and the percentage nutrients are listed under the specific materials.

Nitrogen

Nitrogen stimulates stem and leaf growth (vegetative growth) rather than flowers or fruit. A deficiency is shown by poor growth and pale green leaves. Excess nitrogen stimulates too much dark green growth, which is susceptible to attack by disease.

Most nitrogenous fertilisers supply this nutrient in a soluble form which is freely absorbed by the plant. To obtain balanced growth it is necessary to apply nitrogenous fertilisers in small quantities and at frequent intervals.

Nitrogenous Fertilisers or Manures and Percentage Nitrogen

Dried blood (12 per cent. N): A fairly soluble quick-acting organic manure. A useful organic form of nitrogen.

Blood and bone (approximately 7 per cent. N and 11 per cent. P_2O_5): Nitrogen is more slowly available. Though freely used because it is easily obtained, blood and bone may not be an economical form of nitrogen as compared with other manures or fertilisers.

Bonedust (approximately 3 per cent. N and 25 per cent. P_2O_5): The small amount of nitrogen which is very slowly available makes bonedust an expensive form of nitrogenous material. It can be considered a slow-acting phosphatic manure.

Meat and bone (usually less than 6 per cent. N and about 11 per cent. P_2O_5): Can be considered a lower-quality blood and bone.

Sulphate of ammonia (20.5 per cent. N): A cheap and quick-acting form of nitrogen. Excessive use tends to increase soil acidity.

Nitrate of soda (15 per cent. N): A very quick-acting fertiliser, especially useful as a side-dressing to stimulate growth or to make liquid manures.

Urea (46 per cent. N): A quick-acting soluble fertiliser; usually used as a basis for liquid manure.

Nitrate of ammonia and lime (either 15 per cent. or 20.5 per cent. N): Proprietary fertilisers in granulated condition providing soluble nitrogen in a non-acid form. Good for side-dressings.

Soot (varying percentage to 6): If stored dry for 3 to 6 months, will provide slowly available nitrogen when applied to the soil. It can be used to make liquid manure.

Phosphorus

Phosphorus stimulates the growth of seedlings and root growth generally. It encourages the maturity of flowers and seeds. A deficiency is shown by poor growth, bronzing of leaves, and unsatisfactory flowering. Excess is not known to be harmful to flowers. The majority of new gardens tend to be deficient in phosphates, but owing to the great effect of superphosphate on grassland many gardeners supply excessive amounts of superphosphate without supplementing this with other nutrients. Little benefit is obtained from this unbalanced manuring.

Phosphatic fertilisers provide this nutrient in both a soluble and insoluble form, and persist longer in the soil than nitrogenous fertilisers such as sulphate of ammonia.

Phosphatic Fertilisers and Percentage Phosphate

Superphosphate (20 per cent. P_2O_5): The most commonly used phosphatic fertiliser. It is not an "acid fertiliser", and is usually called "super".

Basic or reverted superphosphate (15 per cent. P_2O_5): This is composed of 75 parts of superphosphate and 25 parts of ground limestone. It is used where soils tend to be markedly acid. It stores well.

Serpentine superphosphate (15 per cent. P_2O_5): Composed of 75 parts of superphosphate and 25 parts of ground magnesium limestone. It is of value where magnesium deficiency is known to exist.

Other forms of superphosphate are manufactured for agricultural use, usually containing trace elements or weedkillers. These should not be used by the home gardener. They are more likely to be harmful than beneficial, as the gardener applies superphosphate at a much heavier rate than the farmer.

Basic slag (16 to 22 per cent. P_2O_5): This contains a variable amount of phosphate which becomes only slowly available to plants. However, basic slag also contains small quantities of other elements and may have additional value for this reason. Bulb growers especially, maintain that basic slag encourages a good colour in narcissus and it is of value as a base dressing for these and similar crops which remain in the ground for several years.

Blood and bone, bonedust, and meat and bone contain phosphorus and nitrogen and are discussed under Nitrogen.

Potassium

Potassium or potash encourages firmness to vegetative growth which balances the stimulus of nitrogen. It is necessary for the production of highly coloured flowers and fruit, especially roses and carnations. A deficiency is shown by some restriction of growth usually accompanied by a brown margin to the edges of the leaves. Excess may cause deficiencies of other nutrients.

Some soils, such as peats and recent volcanic soils, are seriously deficient in potash. Though potash fertilisers are soluble, the element itself can be retained in the soil and become slowly available to plants.

Potash Fertilisers and Percentage Potassium Oxide

Sulphate of potash (48 per cent. K_2O) and **Muriate of potash** (52 per-

cent. or 60 per cent. K_2O): Both are high-grade fertilisers, which supply potash in the most convenient form for garden use.

Woodash (1 to 10 per cent. K_2O): Dry woodash supplies a small amount of potash and lime. Of limited value as compared with the former materials.

Some **seaweeds** have a certain amount of potash in their tissues. They are best mixed into the compost heap to increase the nutrient value of the resulting compost.

Other Plant Nutrients

Spectacular responses have been obtained on agricultural crops and pasture by the use of very small amounts of trace elements such as molybdenum in New Zealand.

Where a gardener uses adequate quantities of bulky manures the soil is unlikely to suffer from trace element deficiencies, though these can occur through over-liming or the excessive use of certain fertilisers like potash. However, if he makes compost solely from his own garden refuse, there is a possibility that trace element deficiencies may occur on soils which are known to be deficient in these elements. Little is known of the symptoms or control of these troubles in ornamental plants.

Where growth of plants is poor other causes should be considered first. After these have been discounted consideration should be given to a trace element deficiency if a specific element is known to be lacking in the particular soil type. The deficiencies can usually be cured by soil dressings or spraying the plants with a chemical containing the element. In all cases the gardener must be sure that the element he intends to apply is in fact lacking.

Recorded deficiencies on ornamental plants are:—

1. **Iron deficiency:** This occurs on alkaline soils where there is free lime. It produces a yellowing of the foliage on plants like hydrangeas. It is best controlled by acidifying the soil with sulphur at 2oz. to 4oz. to the square yard. In the near future it may be possible to purchase soluble iron in the form of chemicals known as chelates which can be sprayed on the plants.

2. **Magnesium deficiency:** This deficiency has been observed on many alluvial soils and has shown as yellowing between the veins of the leaves of plants such as rhododendrons. It can be easily cured by dressing the soil with commercial Epsom-salt at 1oz. to 4 sq. yds. Some rose growers include a small proportion of Epsom-salt in their base fertiliser dressings applied in early spring, even where no deficiency has been observed.

3. **Manganese deficiency:** This deficiency also occurs on soils which are naturally alkaline. It also produces a yellowing between the veins of the leaves on plants such as roses and can be controlled by spraying plants with 2oz. of manganese sulphate, 2½oz. of hydrated lime, 4 gallons of water, or dressing the soil with manganese sulphate at 1oz. to 6 sq. yds.

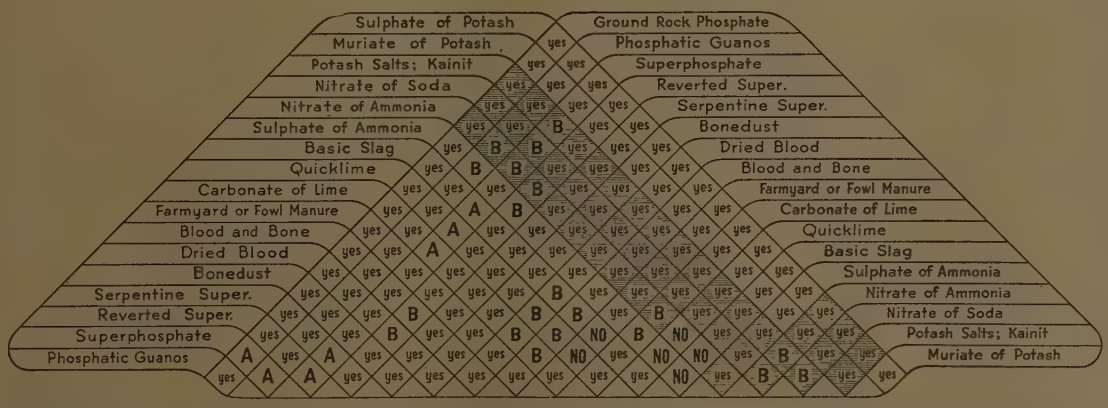
4. **Molybdenum deficiency:** Though molybdenum deficiency has not been recorded on ornamental plants in New Zealand, species of plants known to respond to liming have shown molybdenum deficiency. Legumes, cruciferae, hibiscus, roses, and carnations have shown molybdenum deficiency symptoms overseas. Where a soil, especially in a new garden, is known to be deficient in molybdenum, a light application of lime and dressing the soil with sodium molybdate at 1oz. to 60 sq. yds. should overcome this deficiency.

5. **Copper deficiency** is known to occur on some peaty soils, especially those on the west coast of the North Island. This can be cured with a soil dressing of 1oz. of copper sulphate to 8 sq. yds.

6. **Boron deficiency:** Suspected boron deficiency has been seen on annual asters on a known boron deficient soil. Control is by dressing the soil with borax at 1oz. to 15 sq. yds.

In most cases of trace element deficiency the corrective soil dressings are applied in such small quantities that it is not possible to apply the actual material by itself. In such cases it is necessary to mix the amount of chemical with fine sand so that it can be evenly distributed. An excess of these materials due to applying heavy or repeated dressings can cause damage and is very difficult to rectify.

In general, adequate manuring with compost plus animal manure and the careful use of fertilisers and lime



To find if two fertilisers can be mixed select the one of them which appears nearer the head of the left-hand column. The name will lead to a diagonal row of squares sloping down to the right. Place a ruler or pencil under this to mark it. Find the other fertiliser in the right-hand column and follow down the diagonal to the left. The answer will be found in the square where the two diagonals meet. All mixtures falling in the shaded area will tend to become damp in moist air and will cake on drying out. It is not desirable, therefore, to store them. This tendency will vary according to the proportion of potash salts, kainit, nitrate of soda, or nitrate of ammonia present. If these mixtures contain dried blood, bonedust, or blood and bone, they will remain in better condition, as these substances act as absorbents. A—The soluble phosphate will tend to revert to a less soluble form. B—These may be mixed, but only for immediate use.

should provide a fertile soil on most areas, even where deficiencies have been reported in agricultural crops.

Complete or Balanced Fertilisers

The term complete or balanced fertiliser is not so comprehensive as it would appear. It implies that the compound contains a proportion of nitrogen, phosphate, and potash. Concentrated manures of an organic origin such as fish manure or guano (bird excrement) may have small quantities of trace elements as well.

Where a gardener has a large section it is cheaper to buy the individual fertilisers and make up a balanced mixture. Where there is only a small garden it is almost as cheap and more convenient to buy a complete fertiliser provided this contains a balanced proportion of nitrogen, phosphate, and potash.

The following standard mixtures can be used in the flower garden:—

(a) Material	Weight proportions	Nutrient proportions
Blood and bone ..	3lb.	
Superphosphate ..	1lb.	1 N, 2½ P, 2½ K
Sulphate of potash	1lb.	

This is suitable as a base dressing before planting at 4oz. per square yard and would need supplementing with side-dressings of nitrogen.

(b) Material	Weight proportions	Nutrient proportions
Dried blood ..	3lb.	
Superphosphate ..	2lb.	1 N, 1 P, 1½ K
Sulphate of potash	1lb.	

This is a quicker-acting mixture suitable for stimulating the growth of summer bedding plants, when used at 2oz. per square yard.

(c) Material	Weight proportions	Nutrient proportions
Sulphate of ammonia	2½lb.	
Superphosphate ..	2½lb.	1 N, 1 P, 1 K
Sulphate of potash	1lb.	

This is a suitable mixture to use at 4oz. per square yard in addition to ordinary garden compost when dug in during winter or early spring.

In the United States of America recommendations for manuring are usually quoted as follows: "Apply 3oz. per square yard of a 4-8-4 mixture". This means apply 3oz. per square yard of a fertiliser containing 4 per cent. of Nitrogen, 8 per cent. of P_2O_5, and 4 per cent. of K_2O. The amount of separate fertilisers required to make up this mixture would need to be calculated.

Liquid Manure

Liquid manure can be defined as plant nutrients dissolved in water, so that they are available to plants when watered on to the soil or the plants.

Liquid manure containing a range of plant nutrients is made by filling a large container such as a 40-gallon drum with water and suspending a sugar bag of animal manure or soot in the water for a week. The liquid can then be used in a proportion not stronger than 1 part to 3 parts of water at 2 gallons to 1 sq. yd. Alternatively, nitrate of soda, sulphate of ammonia, or urea at ½oz. to 1 gallon of water can be used to provide a quick-acting nitrogenous liquid manure.

It is most effective during summer, when soil temperatures are reasonably high.

Precautions which should be taken in its use are that the soil should be really moist before it is applied and it should not be used indiscriminately to weak growing plants. These plants may be poorly rooted due to dryness or attack by root diseases and pests. In such cases it is better to water the plants well and spray them frequently with water to encourage a healthy top growth which will stimulate root development.

Raising Seedlings

A new method of raising seedlings by using expanded perlite as the potting medium is described in this month's vegetable garden notes (see page 503).

Liquid manure made from animal manure should be completely used up within a month; otherwise it breeds flies and smells disagreeably.

Proprietary fertilisers which can be added to or dissolved in water are now available. They are usually called soluble or foliar fertilisers. In a small garden it is easier to use these than to make liquid manure from animal manure. It is now accepted that plants can absorb a proportion of their nutrient requirements through the leaves, and part of the effectiveness of these materials is due to their solubility and absorption through the leaves. These soluble fertilisers are especially valuable in the flower garden for the following purposes:—

1. To water seedlings in seed-beds before transplanting.

2. To water seedlings and young plants after transplanting.

3. To spray on or water trees and shrubs during summer when these are making insufficient growth.

4. In a very dilute form to feed leafy pot plants or house plants.

Mixing Manures, Fertilisers, and Lime

Animal manures such as stable or poultry manure should be applied to the soil by themselves and lime or fertilisers applied subsequently.

Fertilisers or lime can be sprinkled over garden compost before it is dug in, though if this or animal manure is used as a mulch, fertiliser should be applied to the soil before mulching.

Though lime can be mixed with certain fertiliser, it is best applied by itself.

Certain fertilisers will react between themselves and with lime or animal manure; the table on page 523 details this information.

Manuring and liming will not replace good culture and a well-drained deeply worked soil. A combination of all four will enable the gardener to grow strong plants, but pest and disease control must still be carried out. Bulky manures should be looked on as a reserve on which soil organisms can draw for their requirements; they will also supply some of the plants' requirements and will improve soil texture. They need to be supplemented by the correct use of lime and fertilisers to obtain the best results.

Garden Work for December

With the approach of the holiday season work in the flower garden will vary, depending on whether the owners are going away or not. Those who are staying at home will have planned the planting accordingly so that the garden is looking its best. Work under these circumstances consists mainly of tidying up and hoeing to keep the weeds down. The edges of lawns should be kept trimmed, as this helps to keep the grass fresh right up to the edge.

Gardeners who are going away should treat the garden in the same manner, and in addition to hoeing a mulch on the flower beds will help. Provided that the soil is moist when the mulch is put on, moisture will be retained in the soil longer and weeds will be kept in check more effectively. Well-rotted stable manure, straw, and sawdust (not fresh) are all suitable materials for using as a mulch. If sawdust is to be used and it is not very well rotted, a dressing of sulphate of ammonia at 2oz. to the square yard should be applied before mulching. Mulching heavily right up to the trunks of trees and shrubs should be avoided, as this restricts the circulation of air and provides favourable conditions for insects, fungi, and bacteria which may injure the plants. All staking of lilies, gladioli, dahlias, and tall-growing perennials should be brought up to date; otherwise, if there are strong winds, the plants will fall over and the flowers be ruined.

Lawns

The 3-monthly topdressing of fertiliser may be applied in December, provided the soil is moist. For average soil a mixture made up of 3 parts

of sulphate of ammonia and 1 part of superphosphate by weight, put on at 1oz. to the square yard, is very satisfactory. As the amount to be applied is very small, the addition of dry sand or soil to the mixture will help to give a more even distribution. This fertiliser not only helps to keep the lawn greener, but discourages flat weeds such as daisies and encourages the fine grasses. Where the garden is to be left for a while, the cutting of lawns and edges should be left until the last, for even if there are a few weeds in the garden, well-kept lawns give a general effect of neatness.

Bedding Plants

Most summer-flowering bedding plants will now be coming into bloom. As a great many of these are annuals and their natural habit is to flower and then set seed, it is necessary to remove dead heads consistently to maintain a regular supply of flowers. Remove not only the dead flower head but also a piece of the stem back to a side shoot or bud, as this will give a better crop of flowers.

Annuals should also be given adequate water, so that there is always moisture around the roots. If they are allowed to dry out for long, the instinct of self-preservation will prevail and they will set seed instead of continuing to flower. If they are properly looked after, annuals will give colour in the garden for a very long time.

It is not too early to think about plants for winter and spring flowering, and the seeds of the following may be sown now: Iceland poppy, Canterbury bells, sweet william, wallflower, pansy, and viola.

Bulbs

By this time the leaves of many spring-flowering bulbs will have died down and they can be removed and burnt. It is also the time to lift bulbs if they are to be transplanted to another position or if they are to be stored.

Clumps of narcissus should be lifted every 3 to 4 years and good bulbs such as hyacinths and tulips should be lifted every year. Do not leave lifted bulbs lying in the sun, as they may get scorched. A dry, well-ventilated shed is ideal for drying them off and narcissus bulbs in particular should be covered with scrim to protect them from bulb fly attacks. Destroy any soft, rotten bulbs and keep only firm, healthy ones for planting out in February and March.

Roses

The main flowering season for roses is nearly at an end and if spent flowers have not already been removed, this should be attended to without delay. When dead heads are being cut off and also when the roses are being picked for indoor decoration stems should be cut back to a healthy bud on firm wood. This not only reduces die-back of the shoots, but also results in the buds breaking into stronger growth and giving a better second crop of flowers. Blind shoots should be cut back to a healthy bud.

[*Sparrow*

Carnations may be increased by taking layers in December. Strong-growing plants which produce good flowers should be chosen.

Climbing roses are now developing long new growths which produce the flowers for next season. It often happens that these growths are cut off because they are getting in the way, but they should be tied to the supports in an upright position and later used to replace the old canes that are removed in the winter pruning.

Bearded Irises

December and early January are the best months for lifting and dividing bearded irises. This need not be done every year unless they are varieties that increase very rapidly. The clumps can generally be left for about 3 years before they need dividing. If this job is left until winter, there will be very few flowers the following season, as the plants do not have time to establish themselves properly.

For replanting choose young, healthy pieces of rhizome with a shoot at one end and cut the leaves back to 5in. or 6in. in height. Planting distances vary with different varieties, but from 12in. to 15in. between each clump is sufficient for the majority of them.

For best results irises should have a warm sunny situation with perfect drainage. The rhizomes should not be completely covered with soil, though they should be planted firmly. A light dressing of bonedust worked well into the soil before planting is the best fertiliser if any is needed, and on soils that are known or suspected to be acid lime may be given at 4oz. to the square yard in spring.

Delphiniums

In many home gardens delphiniums are a favourite for the perennial border and gardeners who are particularly enthusiastic often go to a great deal of trouble to obtain plants of the newer varieties, either by buying them or by sowing seed. Unfortunately the seed often gives poor germination because it is too old. Delphinium seed should be sown as soon as it is ripe and gardeners who save their own seed should sow it as soon as it is harvested. Choose healthy plants to save the seed from, and if sown in a well-prepared seed-bed, the plants will be well enough established to stand winter conditions outdoors. Other seeds that should be sown soon after harvesting include gerbera, phlox (both annual and perennial), perennial asters, heliotrope, viola, *Primula obconica* and *P. malacoides*, lantana, and several members of the lily family.

Carnations

The usual way of propagating carnations in the home garden is by cuttings, but border carnations are often increased by layering. By layering in December the young plants will have time to establish before the cold weather begins. The method of taking layers is basically the same as that described for shrubs in the notes for November. Strong-growing plants producing good flowers should be chosen and the layers should be left undisturbed until March, by which time good root systems will have developed. The young plants can then be put out in their permanent positions.

Pests

Aphids and their control were mentioned in the notes for October and in addition to these pests red mites also build up large populations, especially in very hot, dry weather. These are minute insects which are found on the undersides of leaves on a great many plants. They suck the sap and the leaves turn a silvery brown; with very bad infestations they will die and drop off.

Hosing the plants during dry weather will help to check the insects, and the most effective spray is summer oil 1½ fl. oz. and nicotine sulphate ¼ fl. oz. to 1 gallon of spray, or lindane materials at makers' recommended dilutions.

A complete coverage with the spray is necessary, especially on the undersurfaces of the leaves. Thrip damage becomes noticeable during summer also, the typical symptoms being corky or silvery areas on the leaves. The insects themselves are inconspicuous, as they may be only 1/20in. long, but when present in large numbers they can do a great deal of damage. For effective control a spray of 20 per cent. DDT emulsion (½ fl. oz.) and summer oil (¼ fl. oz. to 2 gallons of water) should be applied.

Raspberries

By MAUD B. STRAIN,
Field Officer in Rural Sociology, Department of Agriculture, Dunedin

ONE of the old nursery rhymes promises its heroine that, among other desirable conditions, she shall "feed upon strawberries, sugar and cream". That, of course, was in the days before the raspberry had been cultivated from the wild state to the luscious berry of today. The ideal way of serving raspberries is with sugar and cream, and they are at their best fresh and uncooked. Unfortunately they are highly perishable and any surplus must be preserved in some way without delay. Deep freezing is particularly suitable, but those who have not the facilities for this method will find that bottled or canned raspberries are second only to fresh fruit. Raspberry jam is perhaps the most widely used jam, being suitable because of its colour, flavour, and texture for almost any recipe requiring jam.

RASPBERRIES are a universally popular fruit. They thrive best in temperate climates and in localities with relatively high summer and low winter temperatures. When fully ripe they deteriorate rapidly and after standing a day or two will have completely lost their distinctive flavour; even in cool storage they cannot be held for longer than 3 or 4 days. They do not stand handling, and for commercial purposes are picked into the containers in which they are to be marketed. Raspberries have a good vitamin C content; one average serving of the fresh fruit provides about one-third of the daily requirement for an adult, and a negligible amount is lost in cooking. (Because copper destroys vitamin C, a brass or copper preserving pan should never be used when jam or jelly is being made, or as a container when fruit is being picked.)

Some there may be to whom the seeds are a nuisance, but for these the fruit may be crushed and passed through a sieve without any alteration to the flavour. The fruit retains its flavour when bottled, but it loses its bright colour. Raspberry jam, which, because it requires so short a cooking time, retains so well the colour and flavour of the fresh fruit, is widely used for desserts and confectionery. The juice or the syrup made from the juice is a favourite beverage and is also used for flavouring for various purposes.

Raspberries ripen early in the season, and this is when they are most suitable for jams and jellies; those harvested later, when the berries mature more rapidly, contain less of the substance (pectin) which gives jams and jellies their setting power.

Some varieties are more acid than others and some are firmer than others. The more acid berries, though good for dessert, are particularly suitable for jam. The varieties which when ripe are comparatively firm are the most suitable for bottling and for freezing. Fully ripe fruit that is too ripe for preserving or making into jam can be used for making raspberry syrup.

Raspberries are not suitable for drying; in common with other soft fruits they do not swell up and resume something approaching their normal appearance when soaked before use, and also they lose practically all of their juice during the process. Experimentally they have been dehydrated, a process which removes, under control, the greater part of their water content. The flavour of the dehydrated product is good, but on being soaked in water the fruit disintegrates.

Like other berry fruits raspberries sometimes have small grubs which no amount of picking over will completely remove. The berries can be soaked for ½ hour in slightly salted water (1 teaspoon of salt to 1 pint of water), when the grubs will float to the surface and can be removed. The fruit must be drained well before it is made into jam or packed into jars for bottling.

A few raspberries used as a garnish give colour, brightness, and interest to a dessert which though delectable in the eating, lacks appeal in its appearance.

Desserts

Most desserts made with raspberries are light and flavourful rather than substantial. The berries can be used successfully for more substantial desserts such as steamed fruit puddings, but their delicacy of flavour and aroma are savoured fully only when they are eaten fresh, ripe, and uncooked. In this state, served with cream and sugar, they make a simple, easily prepared dessert suitable for any occasion. However, the season is short and the fruit highly perishable;

therefore, to be eaten out of season, or even to be carried over for a few days, they must be cooked to stop the action of the substances (enzymes) which, if uninhibited, cause the fruit to become over-ripe and deteriorate rapidly.

Some recipes require juice as well as whole berries. For these, fully ripe fruit can be crushed and the juice used, or syrup from berries cooked gently in the oven may be used. The most satisfactory method of stewing raspberries is to make a syrup by boiling together for 1 to 2 minutes 3oz. of sugar and ½ pint of water. Pour this syrup over raspberries placed in a casserole or other coverable dish, and cook them gently with the cover on for a few minutes at 300 to 350 degrees F.; then leave the fruit undisturbed for 10 minutes while it cools. This method is the one most likely to preserve the shape and colour of the fruit and to give a bright, clear syrup. Raspberry puree is made by crushing ripe berries and rubbing them through a sieve.

Raspberry Mousse 1

½ pint of thick custard
½ pint of sweetened raspberry puree
1 tablespoon of lemon juice
¾oz. of gelatine
3 tablespoons of water
½ pint of whipped cream or evaporated milk

Mix the custard while hot with the raspberry puree (crushed raspberries) or 4oz. of raspberry jam; then sieve the mixture. Soften the gelatine in the water for a few minutes, and then heat it gently, stirring it continuously while it melts. Mix the lemon juice and a little red colouring (if necessary) with the cooled custard mixture, and when the mixture is on the point of setting quickly fold in the whipped cream or milk. Pour the mixture into a mould and leave it to set. Unmould the mousse and decorate it with cream and fresh fruit.

Raspberry Mousse 2

12oz. of crushed ripe raspberries
6oz. of castor sugar
2 tablespoons of lemon juice
1 pint of whipped cream of chilled evaporated milk

Add the sugar to the raspberries and stir these until the sugar is dissolved. Whip the cream or chilled evaporated milk and fold in the lemon juice and the raspberry mixture. Chill the mixture until it is firm.

Raspberry Fool

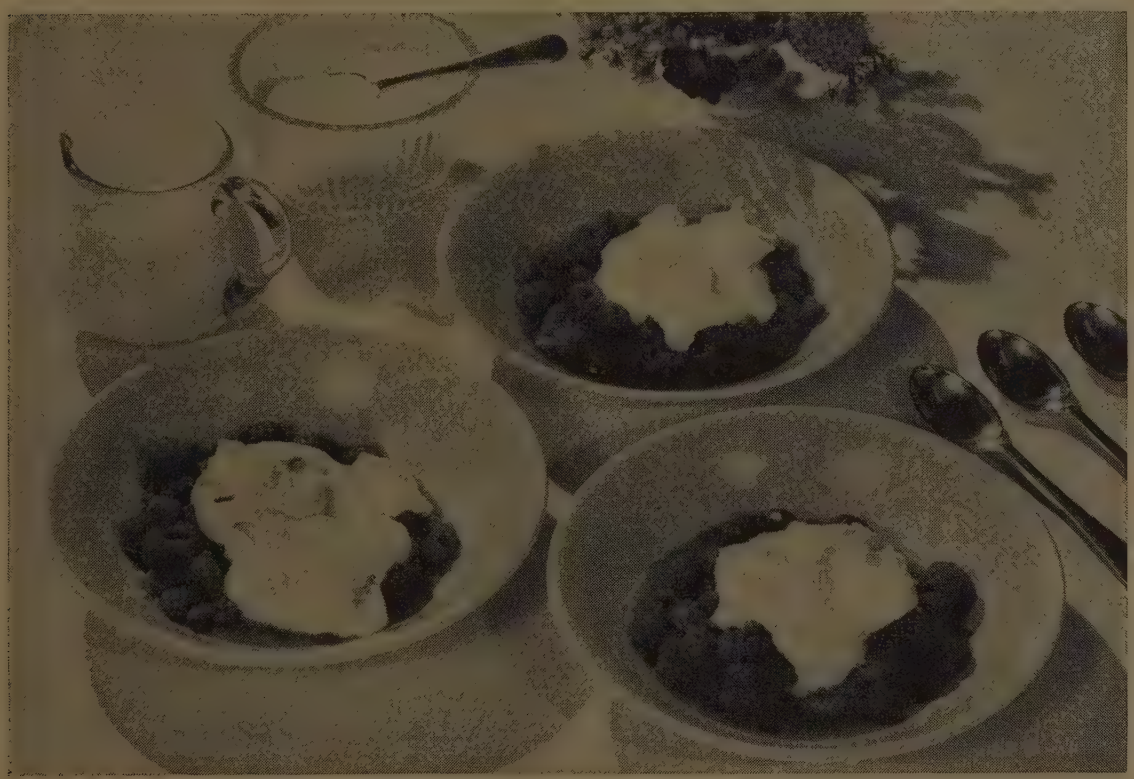
1lb. of raspberries
Sugar to taste
½ pint of whipped cream or ½ pint of custard

Sprinkle the raspberries with sugar to taste, leave for 3 to 4 hours, and then sieve them. Mix the puree with ½ pint of cream or custard or a mixture of both, colour it if required, and chill it until it is firm.

Raspberry Cream

½ pint of sieved raspberry jam, or crushed, sieved, fresh raspberries
3oz. of sugar
2 teaspoons of lemon juice
½oz. of gelatine
2 tablespoons of water
½ pint of cream

Soften the gelatine in 2 tablespoons of cold water; then heat the mixture gently until the gelatine is dissolved. Add the sugar and stir the mixture until the sugar has dissolved; then add the lemon juice and the jam or puree. Whip the cream stiffly and fold it into the gelatine mixture and pour the mixture into a mould to set.



Fresh, fully ripe raspberries served with cream make a dessert suitable for any occasion.

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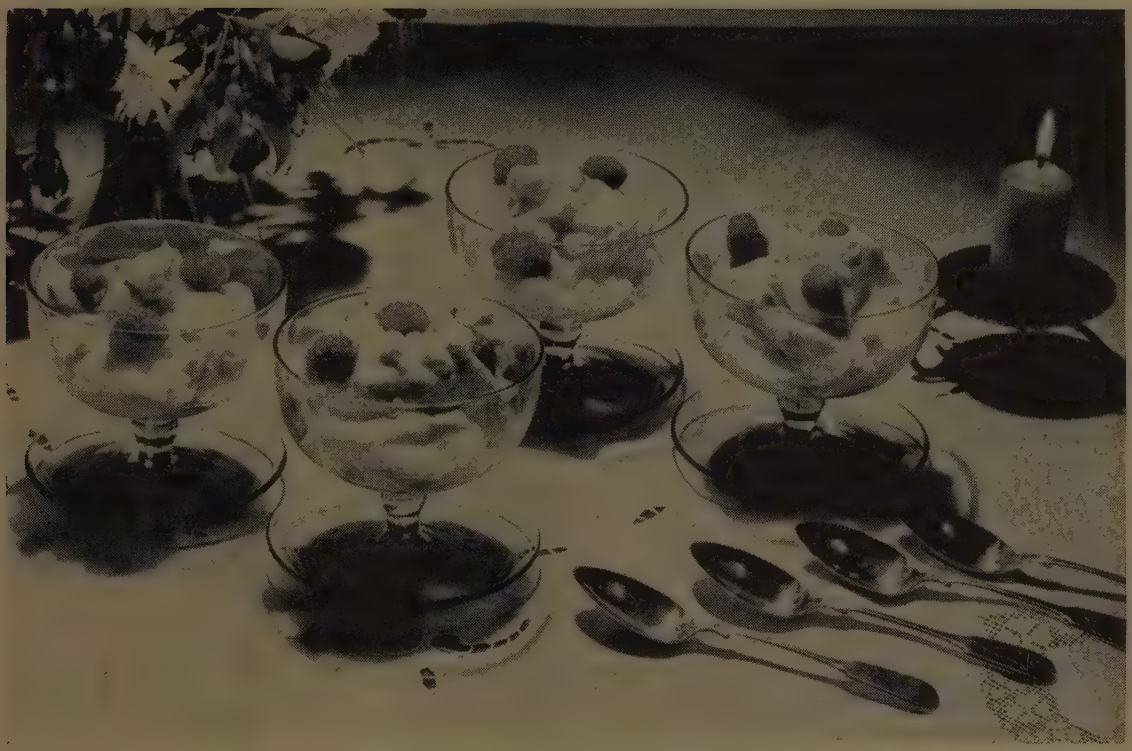


Luscious raspberries are an attractive garnish for these individual portions of raspberry Bavarian cream.

Raspberry Whip and Custard

1 tablespoon of gelatine
2oz. of sugar
¼ cup of water
2 teaspoons of lemon juice
¾ cup of boiling water or hot fruit juice
1 cup of crushed raspberries
2 stiffly beaten egg whites

Soak the gelatine in cold water, add the boiling water or fruit juice, and stir the mixture until it is dissolved. Add the sugar and dissolve that also before adding the lemon juice. Cool the mixture and when it is on the point of setting add the fruit pulp; then beat the mixture until it is light and frothy, fold in the stiffly beaten egg whites, and leave the mixture aside to set. Make a custard with 2 egg yolks, 2oz. of sugar, and ½ pint of milk, beaten together and heated over hot water until the mixture coats the back of a wooden stirring spoon. Serve the custard with the raspberry whip.

Raspberry Bavarian Cream

½oz. of gelatine
2 tablespoons of water
½ pint of cream
6oz. of raspberries
1 teaspoon of lemon juice
1 beaten egg
½ pint of milk
3oz. of sugar.

Make a custard by heating the milk, sugar, and beaten egg over hot water until the mixture coats a wooden stirring spoon. Soften the gelatine in 2 tablespoons of cold water, pour the hot custard on to the gelatine, and stir the mixture until the gelatine is dissolved. Crush and sieve the raspberries. Whip the cream stiffly and fold in the lemon juice and raspberry puree. When the custard is on the point of setting fold in the cream mixture and pour the whole into a mould to set.

Variation

Raspberry charlotte: Pour the Bavarian cream mixture into a mould lined with sponge fingers the tips of which are held firmly in place by a ½in. layer of jelly set in the bottom of the mould. When the jelly is firm unmould it carefully and decorate it with whipped cream and whole, fresh raspberries.

Raspberry Gateau

1 round sponge cake 1½in. thick
1 cup of fresh raspberries
1 cup of raspberry juice
Whipped cream
1 teaspoon of cornflour
Sugar to taste
1 teaspoon of lemon juice

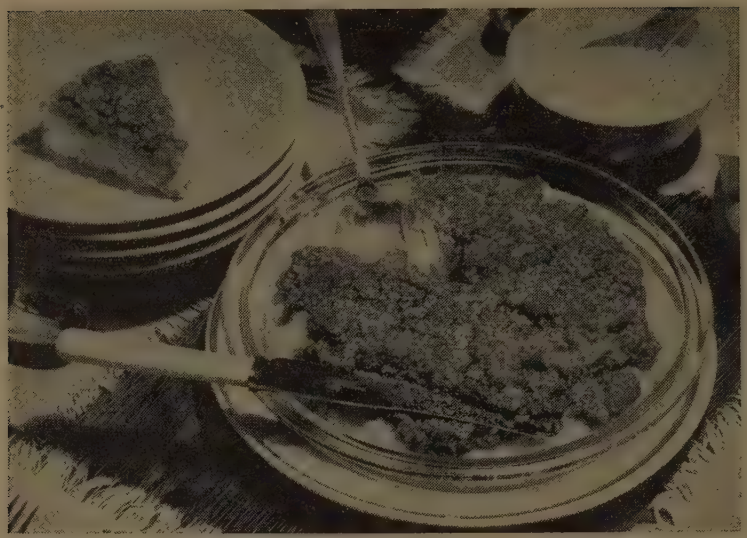
One tin of raspberries may be used instead of the cup of raspberries and cup of raspberry juice.

Remove a circle of about 2½in. to 3in. diameter from the centre of the sponge cake. Place the sponge ring on a glass dish and fill the centre with fresh raspberries. Heat the raspberry juice and lemon juice with sugar to taste and thicken the mixture with a teaspoon of cornflour mixed with a little cold water. Pour the thickened juice over the sponge ring and leave it until it is cold. Decorate the sponge with whipped cream and a few whole berries.

Raspberry Refrigerator Cake

1 tin of sweetened condensed milk
1 cup of raspberries
Biscuit crumbs
¼ cup of lemon juice

Mix the condensed milk and lemon juice. Add the prepared raspberries. Line a cake tin with waxed paper and place a layer of the fruit mixture in it, then a layer of biscuit crumbs. Place alternate layers of fruit and biscuit crumbs in the pan, concluding with a layer of crumbs. Chill the cake thoroughly. Unmould it and decorate it with whipped cream and fresh fruit.



Raspberry shortcake is suitable for any time of the year. Fresh, bottled, or frozen raspberries or raspberry jam can be used.

French Raspberry Ice Cream and Custard

½ pint of custard
½ tin of evaporated milk
1 dessertspoon of lemon juice
4oz. of strained raspberry jam
1oz. of castor sugar
1 stiffly beaten egg white

Make a custard by heating ½ pint of milk, 2oz. of sugar, and a lightly beaten egg yolk over boiling water until the mixture coats a wooden stirring spoon. Whip the evaporated milk with the sugar. Mix the strained jam and lemon juice with the custard and fold this mixture into the whipped milk. Lastly, fold in the stiffly beaten egg white and pour the mixture into freezing trays. Stir the mixture well each ½ hour until it is frozen.

Raspberry Cream Ice

¼ pint of raspberry puree sweetened to taste or 4oz. of strained raspberry jam
1 teaspoon of lemon juice
½ pint of cream or evaporated milk

Whip the cream until it is light and fluffy and add the strained jam and lemon juice together. Place the mixture in freezing trays and stir it well each ½ hour until it is frozen.

Raspberry Meringue Cake

Cake Base

4oz. of flour
2 teaspoons of baking powder
½ cup of milk
5oz. of sugar
3oz. of butter
2 egg yolks
Few drops of lemon essence

Meringue Top

2 egg whites
4oz. of sugar

Make a meringue by whipping the 2 egg whites stiffly and gradually beating in the 4oz. of sugar. Cream the butter. Add the 5oz. of sugar and continue creaming until the mixture is light coloured. Add the egg yolks (well beaten) and the flavouring essence. Add the flour (sifted) and baking powder alternately with the milk and pour the mixture into a greased and floured 9in. oven-glass pie-plate. Pile the meringue on top, making it higher round the edges and hollowed out in the centre. Bake the cake in a moderate oven (350 degrees F.) for 40 minutes. When the cake is cold fill the hollow in the centre with fresh raspberries sprinkled with castor sugar.

Raspberry Flan

Line an oven-glass pie-plate with short pastry. Lay the pastry over the plate and without stretching the pastry press it firmly to the plate from the centre to drive out air bubbles from underneath. Bring it up well over the edge and cut it off level with the outside edge of the rim. Prick the bottom of the pastry case and cover it with a circle of greaseproof paper. Fill the case with bread crusts or dried beans to hold it in shape during baking and to prevent the walls from sagging inward. Bake at 350 to 375 degrees F. for 25 minutes. Remove the crusts or beans and the paper. When the case is cold fill it with fresh raspberries and over them pour a jelly made as follows:—

1 level dessertspoon of gelatine
1oz. of sugar
½ pint of water
1 teaspoon of lemon juice
1 tablespoon of raspberry jam

Soak the gelatine in 2 tablespoons of water. Boil the remainder of the water with the sugar and jam for 1 to 2 minutes. Strain this mixture on to the gelatine and stir it until the gelatine is dissolved. Add the lemon juice. Allow this liquid to cool, but before it starts to set pour it over the raspberries.

Raspberry Shortcake 1

6oz. of flour
3oz. of butter
2oz. of sugar
1 egg
¼ teaspoon of salt
1 teaspoon of baking powder
Milk to mix

Cream the butter, add the sugar, and continue creaming. Beat the egg well and add 2 tablespoons of milk to it. Mix this in with the creamed butter and sugar. Add the flour sifted with the baking powder and mix all to a soft dough. Divide the dough in halves and pat each half to fit a sandwich-cake tin. Put one layer in the bottom of the tin, cover it generously with fresh raspberries, put the other layer on top, and cook the cake in a moderate oven (350 to 375 degrees F.) for 20 minutes. Serve it hot with cream.

Alternatively, the first layer of shortcake may be brushed over with melted butter and the second layer placed on top. When cooked the two layers will be separate. When they are cool remove them from the tin. Cover one layer with fresh raspberries and whipped cream. Place the other layer on top, cover it with whipped cream, and decorate it with raspberries.

Raspberry Shortcake 2

4oz. of sugar
4oz. of butter
2 eggs
4oz. of flour
½ teaspoon of baking powder

Cream the butter, add the sugar, and beat the mixture until it is light and creamy. Add the eggs one at a time, being careful to mix each egg in well before the next is added. Mix in gently the flour sifted with the baking powder. Spread this mixture on a papered baking tray to the depth of 1in. Bake at 350 degrees F. When the cake is cool split it across with a sharp knife. Put a layer of whipped cream generously studded with ripe raspberries on the bottom piece, cover the cream with the top piece of cake, and cover this with more whipped cream and raspberries. Cut with a hot, sharp knife.

Raspberry Batter Pudding

8oz. of flour
1 pint of milk
½ teaspoon of salt
1 cup of fresh raspberries
2 eggs

Sift the flour and salt together. Whisk the eggs and add them to ½ pint of the milk. Blend this mixture with the flour and salt and beat it to a stiff batter. When the batter is smooth add the remainder of the milk a little at a time, beating well with each addition. Pour the batter into a well-greased, pre-heated baking tin, scatter the raspberries on top, and bake the pudding from 25 to 35 minutes at 425 degrees F.

To cook raspberries for recipes requiring fruit and juice boil together ½ pint of water and 3oz. of sugar. Place the fruit in an oven-glass casserole, pour the syrup over it, cover

the casserole, and cook the raspberries gently in the oven for a few minutes.

Frozen Raspberries

Raspberries are suitable for deep freezing. The firmer varieties are preferable. The berries must be fresh, of good quality, and just fully ripe. If at all dusty, they should be washed in ice-cold water and then packed in flat cartons lined with moisture-proof and vapour-proof wrappers. As much air as possible must be expelled from the package and room must be left for expansion during freezing.

Each carton should hold sufficient for one meal, because once the fruit is thawed it deteriorates rapidly and cannot be refrozen.

The berries may be packed in ice-cold syrup or mixed in a bowl with fine sugar and then packed in lined cartons. With softer berries a puree may be made by rubbing the fruit through a sieve and mixing the pulp with sugar in the proportion of one part of sugar to three or four parts of puree.

With Syrup

Use a light syrup made by mixing 1lb. of sugar in 1 quart of water. This is brought to boiling point, covered, cooled, and chilled, then poured on the fruit in the container, covering the fruit but leaving room for expansion during freezing.

With Dry Sugar

One pound of sugar to 3lb. or 4lb. of fruit, depending on taste, are suitable proportions when the berries are frozen in dry sugar.

Bottled Raspberries

Raspberry varieties that are comparatively firm when ripe are most suitable for bottling. Select firm, mature berries in prime condition and fresh and clean and bottle them as soon as possible after picking. They may be preserved in syrup or they may be bottled in their own juice without sugar. Bottled in syrup they do not retain their bright red colour, but the flavour is excellent. Preserved in their own juice they retain their colour fairly well and their flavour is natural. This is a good way of preserving them to make jam later.

In Syrup

Pick over the berries, discarding any that are over-ripe, and pack them into clean, warmed jars. Shake them down now and again so that they will sink into place and give a full pack. Make a syrup by boiling together for 3 minutes sugar and water in the proportion of 1 cup of sugar to 3 cups of water. Pour this syrup over the fruit in the jars. If the jars have zinc screw tops or clip-on glass tops, fill them to the top, but if they have self-sealing lids or plastic skin covers, do not fill them higher than ½in. from the top. Wipe the rims of the jars to remove any syrup or anything that might break the seal.

Adjust the lids on the jars and process them in a water bath for 20 minutes after the water reaches boiling point. Remove the jars, tighten screw tops or the clips on clip-on jars, and invert both these types, but do not touch and do not invert either of the other types. After 24 hours examine the seal, label the jars, and store them in a cool, dark cupboard.

In their Own Juice

Fill warmed jars with the berries, shaking or tapping the jars from time to time to give a full pack. Cover each full jar with a patty-pan or saucer and place the jars in a moderate oven (250 to 275 degrees F.) for ¾ to 1 hour for quart-size jar. When the fruit shrinks it is advisable to use one or two of the bottles for filling up the others until each is full. When the berries are cooked adjust the lids according to type and stand the jars on a dry wooden surface out of a draught to cool. Next day test the seals, label the jars, and store them.

Raspberry Jam and Jellies

Raspberry Jam

A mixture of ripe and slightly under-ripe berries is desirable. The former give a good flavour and the latter are a little richer in pectin, the substance that makes jam set.

Heat 6lb. of raspberries with 4½lb. of sugar in a large preserving pan, stirring continuously to break up the fruit and prevent it from sticking. Heat it to boiling point and let it boil briskly for 5 minutes. Allow the jam to cool slightly, then pour it into clean, warmed jars. Cover and label the jars and store in a cool, dark place. If the jam is not being used for some time, it is advisable to cover it with a layer of paraffin wax. This prevents the jam from losing moisture and shrinking in the jar. Melt the paraffin wax and pour it over the surface of the jam and about ¼in. up the sides of the mouth of the jar. Cover the jars with transparent cellulose covers.

This recipe gives jam of good natural colour with the flavour of fresh fruit.

Raspberry Jelly

Raspberries not fully ripe can be used for jelly making. Fully ripe fruit, from which the juice runs, is not suitable alone but requires the addition of the juice of a fruit rich in pectin such as red currants, gooseberries, or green apples. Care must be taken that no mouldy berries are included. Best results are obtained with small quantities at a time.

Heat 6lb. of raspberries very slowly over low heat, crushing and stirring them until they are soft and completely broken up. Do not allow the fruit to boil. Strain the fruit through a jelly bag and let it drip overnight. Measure the juice and allow 1lb. of sugar to each pint of juice. Heat the juice to boiling point in an enamel or aluminium preserving pan, add the sugar, and boil the jelly until it gives the sheeting test; that is, when the liquid drips from the spoon not in a stream or quick succession of drops, but in several thick drops which run together and fall off slowly as a big drop. Remove the jelly from the heat and allow it to stand for a few minutes until the bubbles subside. Remove any heavy scum and ladle the jelly into clean, warmed jelly jars and cover the jars with melted paraffin wax and later with transparent cellulose. Label the jars and store them in a cool dark place.

Raspberry and Apple Jelly

3lb. of windfall apples 3lb. of raspberries Sugar

Use clean fruit. Wipe the apples to remove any dust or remains of spray from the skins, but do not peel or core them. Cut them up and put them with the raspberries in a preserving pan. Add sufficient water barely to cover the fruit and cook the fruit until it is soft and completely broken up. Strain the pulp through a jelly bag overnight. Measure the juice and add 1lb. of sugar for each pint of juice. Heat the juice, add the sugar, and boil briskly for a few minutes until the jelly gives the sheeting test.

Raspberry and Red Currant Jelly

3lb. of red currants 3lb. of raspberries Sugar

Stew the fruit gently in sufficient water barely to cover it until it is soft and well mashed up. Allow it to drip overnight through a jelly bag. Measure the juice and allow 1lb. of sugar to each pint of juice. Proceed as in the raspberry jelly recipe.

Raspberry Juice and Syrup

Fruit syrups, like jams, are made from fruit and sugar, but unlike fruit for jams over-ripe fruit is better than under-ripe fruit, as it has more flavour and more juice is obtained from it. The fruit must be fresh or the flavour will be poor, and it must be clean and free from dust.

The fruit can be put in a basin which is allowed to stand in a pan of hot water at the back of the range, or it may be treated in a basin over gently boiling water until the juice flows freely. Frequent stirring and mashing of the berries help in the extraction of juice. To ensure that the juice retains its maximum flavour and colour do not allow it to boil. When all the juice appears to be extracted the contents of the basin are strained through a jelly bag. As it does not matter if the juice is not

clear, the jelly bag can be squeezed to extract every drop of juice. This juice can be bottled, processed, and stored as it is, if desired, but practice has shown that the fresh fruit flavour is not retained nearly so well as in fruit juice that is sweetened before bottling.

Add 3oz. of sugar to each pint of juice. Heat the juice to dissolve the sugar.

Fill sterilised, hot bottles or jars with the juice. Cover the containers with plastic skin, screw-on zinc tops, corks, or crown tops. Jars should be filled to overflowing, but bottles should have 1in. to 2in. of space left. Corks should be sterilised before use and be tied or wired on.

Stand jars in a water bath. Bottles lie on their sides. Fill the water bath with water at the same temperature as the juice. Heat the water to 180 degrees F. and keep it at that temperature for 20 minutes. Allow it to cool. Remove the containers and close them securely. Crown-top bottles require no further attention.

When corked bottles have become cold and the cork has been drawn further into the bottle, the corks and ½in. of the necks of the bottles should be dipped in melted paraffin wax.

Store the containers in a cool, dark place.

Other Uses

Raspberries are not usually used for making pickles, sauces, and chutneys. Other methods of preservation in which the delicate flavour will not be masked by vinegar and spices are much to be preferred.

☆

A Summer Blouse in Lace Pattern

THE lace pattern blouse illustrated is a charming little garment for summer wear and goes well with a skirt or costume.

ABBREVIATIONS: K., knit; m., make; p., purl; st., stitch; inc., increase; dec., decrease; sl., slip; tog., together; p.s.s.o., pass slipped stitch over; rep., repeat; t.b.l., through back of loop; cont., continue; beg., beginning; in., inches; m.st., moss stitch; patt., pattern.

Materials: 3 2oz. balls of No. 5 perle cotton; 2 No. 12 and 2 No. 14 knitting needles; 2 small buttons.

Measurement: Length, 18½in.; bust, 34in.

Tension: 1 patt. (10 st.) measures about 1½in.

Front: With No. 14 needles cast on 100 st. and work 3in. in k. 1, p. 1 rib.

Next row: Work twice in first st., rib 3, work twice in next st., * rib 4, work twice in next st. Rep. from * to end (121 st.).

Change to No. 12 needles and work in patt. thus:—

1st row: * k. 3, k. 2 tog., m. 1, k. 1, m. 1, sl. 1, k. 1, p.s.s.o., k. 2. Rep. from * to last st., k. 1.

2nd row: * p. 2, p. 2 tog., t.b.l., m. 1, p. 3, m. 1, p. 2 tog., p. 1. Rep. from * to last st., p. 1.

3rd row: * k. 1, k. 2 tog., m. 1, k. 5, m. 1, sl. 1, k. 1, p.s.s.o. Rep. from * to last st., k. 1.

4th row: P. 2 tog., * m. 1, p. 7, m. 1, p. 3 tog.; rep. from * ending last rep. P. 2 tog., instead of p. 3 tog.

5th row: As 1st row.

6th row: P. to end.

7th row: * k. 1, m. 1, sl. 1, k. 1, p.s.s.o., k. 5, k. 2 tog., m. 1. Rep. from * to last st., k. 1.

8th row: * p. 2, m. 1, p. 2 tog., p. 3, p. 2 tog., t.b.l., m. 1, p. 1. Rep. from * to last st., p. 1.

9th row: * k. 3, m. 1, sl. 1, k. 1, p.s.s.o., k. 1, k. 2 tog., m. 1, k. 2; rep. from * to last st., k. 1.

10th row: * p. 4, m. 1, p. 3 tog., m. 1, p. 3 Rep. from * to last st., p. 1.

These 10 rows form the patt. Cont. in patt. until work measures 17½in. from cast-on edge. Work in m.st. on all st. for 1in.

Next row: Cast off 43 st., m.st. to end.

Next row: Cast off 43 st., leave remaining 35 st. on a spare needle.

Back: Work as for front until work measures 17½in. from beg.

Next row: M.st. 59, k. 2 tog., turn.

Cont. in m.st. on these 60 st. for 1in., ending at side edge.

Next row: Cast off 43 st. and leave remaining st. on a spare needle. Rejoin cotton to other 60 st. and work to match. Join shoulder seams.

Collar: With right side of work facing and using No. 12 needles begin at centre back and work in m.st. across 17 st. for back, 35 st. for front, 17 st. for second half of back. Work in m.st. for 1in. Cast off loosely in m.st.

Sleeve borders: With No. 14 needles cast on 11 st. and work in m.st. for 11in. Cast off. Work a second piece in same way.

To make up: Press work lightly on wrong side with hot iron and damp cloth. Mark a point 7in. on each side of shoulder seam at side edges of back and front with pins. Now pin sleeve border along this 14in. edge, easing in the extra fullness on each side of shoulder seam to shape shoulder and stitch into position. Sew on second sleeve border in same way. Join side seams. Make 2 small button loops on right side of back opening beneath collar. Sew on buttons to match. Press seams.

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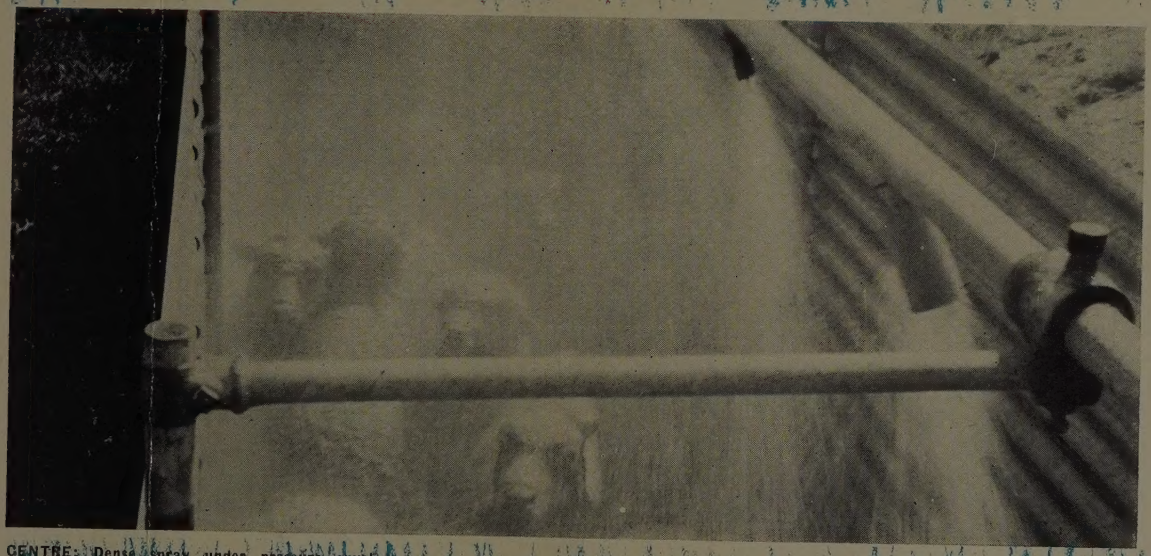

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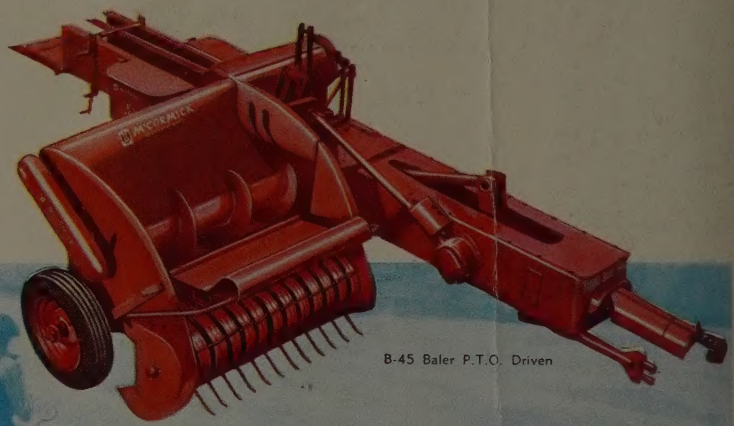

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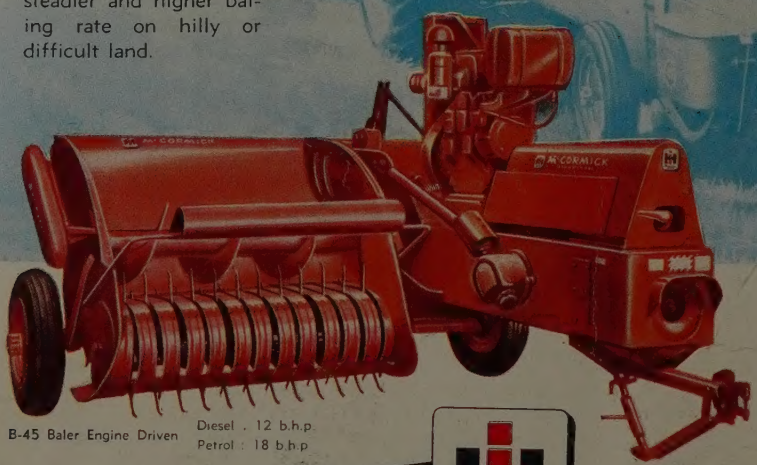

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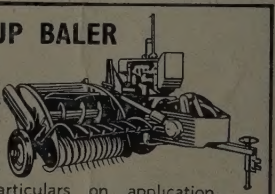

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